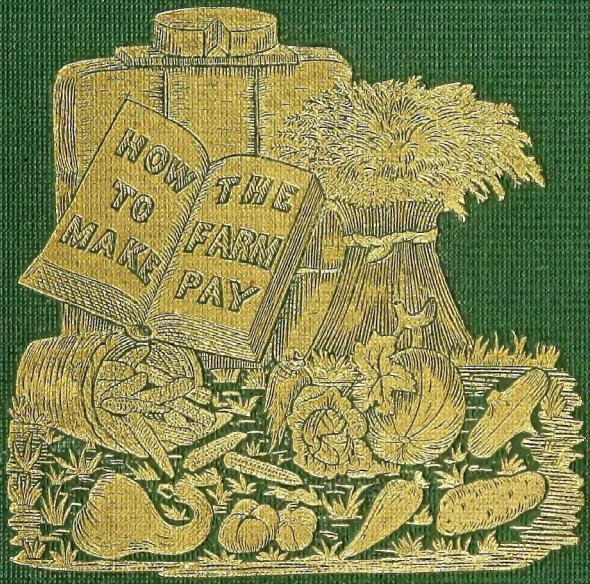
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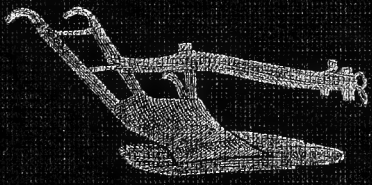

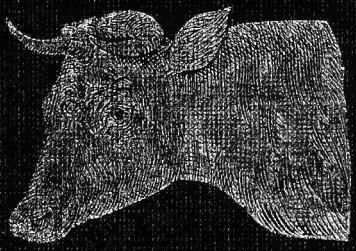

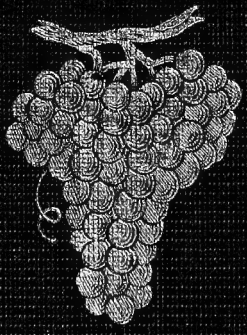

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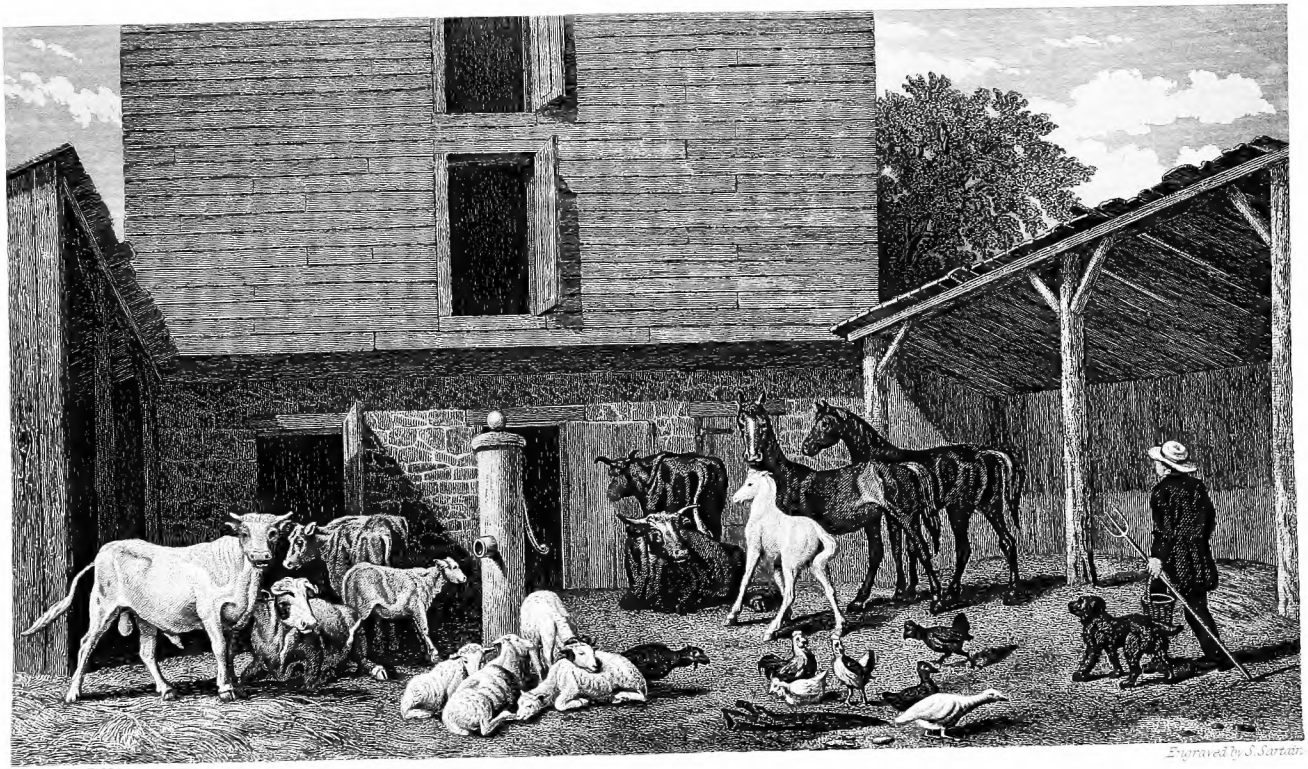

Painted by P. Moran.

Engraved by S. Sartain.

HOW TO MAKE THE FARM PAY;

OR,

THE FARMER'S BOOK

OF

PRACTICAL INFORMATION

ON

AGRICULTURE, STOCK RAISING,

FRUIT CULTURE, SPECIAL CROPS,

DOMESTIC ECONOMY & FAMILY MEDICINE.

BY

CHARLES W. DICKERMAN,

MEMBER OF THE PENN. AGRICULTURAL SOCIETY, THE AMERICAN POMOLOGICAL SOCIETY, AND THE PENNSYLVANIA HORTICULTURAL SOCIETY.

ASSISTED BY

HON. CHARLES L. FLINT,

Secretary Mass. State Board of Agriculture,

AND OTHER PRACTICAL AGRICULTURAL WRITERS.

ILLUSTRATED WITH ONE HUNDRED AND FORTY ENGRAVINGS

P. W. ZIEGLER & CO.,

PHILADELPHIA AND CHICAGO.

1876.

TO

JOHN JOHNSTON,

OF GENEVA, N. Y.

THE VETERAN PROMOTER OF ALL AGRICULTURAL

IMPROVEMENT IN THIS COUNTRY,

THIS VOLUME IS

DEDICATED WITH THE SINCERE ADMIRATION OF

THE AUTHOR.

PREFACE.

NO one at this day doubts the importance of agricultural information. Knowledge in this department is not only power, but it is wealth, individual and national. That system of cultivation which produces two blades of grass or two kernels of grain where only one grew before; which produces two quarts of milk or two pounds of meat in place of one, must not only be a benefit to each individual producer, but of immense advantage to the country and the world. Great improvements have been made in the past twenty years. Underdraining, improved machinery, the better understanding of the rotation of crops, and the application of manures, and the improvements in the breeds of domestic animals, have all helped to raise Agriculture, from mere drudgery, to an important science. And improvement must still continue. Only a small proportion of the great body of farmers have adopted the advanced position in modern agriculture. The great mass of farmers are still laboring under the disadvantages of a false and ruinous system of agriculture, without knowing just how to better their position. It is the duty of those who do know, to bring their knowledge to the use of these their brethren in toil. Much of the best talent of the country is devoted to this object. Agricultural colleges are springing up on every hand. Men of genius, of the best scholarship, of great scientific attainments, are devoting their lives to the work of bringing forth the secrets of the soil. Enterprising young men of good abilities are putting their hands to the plow, and the plow to the furrow, resolved to

leave the mark of improvement on the work of the farm. The labor of the farmer is thus elevated. What has always been claimed by a few, will soon be acknowledged by all, that the prosperity of a country depends upon the intelligent cultivation of the soil.

In this land of schools, where every child can have an education, knowledge is easily disseminated. Improved methods of culture can be spread broadcast over the land by means of books and papers. For these reasons American farmers are more intelligent than the same class in any other country. Few farmers are now so ignorant as to scoff at agricultural information. They desire it, and welcome it. The trouble has been and is, that it is not given them in a form adapted to their wants. There have been many technical and scientific works, containing most valuable information, but in language not readily understood. These works are very largely theoretical, and the practical is not so distinctly separated as to be easily applied.

They have performed a noble service, for without the information they have contained, but little advance would have been made.

The agricultural papers come down more nearly to the wants of the farmer, and we advise every farmer to take some agricultural paper. They furnish many useful hints and valuable suggestions, and serve to interest the younger members of the family in the labors of the farm. But agricultural papers are not wholly satisfactory. Of course, each number can refer to only a limited variety of subjects, and a farmer may take the paper for years before he gets information upon the very subject he wishes most to know about. Again, much that is in these papers is crude. Many theories are given that have not been sufficiently tried, and must be received with the greatest caution. The records of carefully conducted experiments are the most valuable part of these papers, if the farmer has the wisdom and patience to study them, and apply their principles to his practice.

There is another class of agricultural books, by our best writers, on specific subjects, the objection to them being their cost. In order to make a book, a great deal is put in that is curious and interesting, but not practical. For instance, one of our best writers has recently published a book on "Wheat Culture," which, while it contains nearly all that is practically worth knowing about the plant, is so full of other matters, as to be called by the editor of one of our agricultural papers, "The Romance and Curiosities of Wheat Growing." It is just the avoidance of these superfluities which is aimed at in the present work, while all the *practical* information is retained. To obtain information on all the subjects treated of, it would be necessary for the farmer to purchase books upon drainage, manures, implements, wheat culture, grasses, sheep-husbandry, milch cows and dairy farming, horses, cattle, fruit culture, market gardening, and numberless other books, large and small, requiring much money to purchase, and much time to read

To make the present volume wholly reliable, it has been aimed to record nothing but what has been *proved* in practice, beyond a doubt. Mere theory has been rejected. Some valuable ideas have in all probability been thus lost, but it is the only safe course; the only course by which the farmer can be saved from disastrous mistakes. The results of practice in different sections and on different soils have been carefully compared with the recorded opinions of the oldest and best of our own writers; and much valuable assistance has thus been received from such able, careful, and practical men as the Hon. Charles L. Flint, Secretary of the Massachusetts State Board of Agriculture, (to whom the reader is indebted for the valuable chapters on Agricultural Implements and Dairy Stock, in this volume;) John H. Klippart, of Ohio; S. Edwards Todd, of New York; Professors Norton and Johnston, of Yale College; J. J. Thomas, of Albany, New York; Norman J. Coleman, of St. Louis, Mo.; Lewis F. Allen, of New York; Robert Stewart, M. D., V. S., author of "The American Farmer's Horse

Book;" Henry S. Randall, L.L. D., author of "The Practical Shepherd;" George H. Dadd, V. S.; Andrew S. Fuller, Peter B. Mead, and Dr. C. W. Grant, of New York; George Hussman, of Mo.; Edmund Morris, of New Jersey; Donald G. Mitchell, of New Haven, Conn.; Charles B. Williams, of Va.; Joseph B. Lyman, of La.; Fearing Burr, Jr., of Boston, author of "The Field and Garden Vegetables of America;" Marshall P. Wilder, Robert M. Copeland, Joseph Breck, and Edward S. Rand, of Boston; Patrick Barry, of Rochester, New York; L. L. Langstroth, of Ohio, and many others. To all these gentlemen the author tenders his most sincere acknowledgments.

In writing this volume, the author has kept steadily in view the requirements of the East, the West, and the South with her fields newly opening to agricultural enterprise. That it will fully meet the wants of every farmer is too much to expect; but that it will more fully meet them than any other single volume is his hope and belief. With the sole desire that it may be of permanent value to his brethren of the Plow, the author commits it to the Press.

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INTRODUCTION.

AGRICULTURAL LITERATURE.

BY HON. CHARLES L. FLINT.

"AGRICULTURAL Literature!" we can imagine we hear the reader exclaim; "what has the barnyard, the cart horse, the milk pail, the plough, or the corn field, homely objects, interesting, no doubt, but by no means literary, to do with literature?" Much, let me tell you. More than appears at first sight, for in these subjects are found the results of scientific knowledge, of the great and immutable truths of chemistry, of physiology, of the laws of breeding, of mechanics, of botany, of entomology, in fact, of every science and of many arts.

What literature has done for theology, for astronomy, for all the sciences that elevate and adorn humanity, she is ready to do for Agriculture, the art of arts, to which we owe all the comforts of civilized life.

Says the editor of the "*Rural World*":—

"*Book Farming—what is it?* It is simply the best farming put in books—yours, reader, if it is the best. A fool cannot write a book an able man must do it—not a man of mere

accomplishments or learning—but one versed in the business he writes upon. It is thus that we have books by the best men in all the departments. These make our literature—and to be opposed to them, is to be arrayed against knowledge, against schools and newspapers. What is thought of the man who opposes education? And what is education, but to learn to know a thing? If the prejudiced reader, (prejudiced against book farming,) knows how to trim his vine, he is the man, if he has words for it, to write a book on the subject—the very man we want, for we are after facts, after the best mode. And yet this would be called 'book farming.' It is mere prejudice, depend upon it."

It is one of the most striking and encouraging signs of the present period, in the history of Agriculture, that it has been able to call the highest talent to its aid, and that men of science, in all departments, have devoted their lives to investigations designed to promote its progress. We can remember the time when even farmers themselves were quite indifferent to the assistance which scientific investigations could offer them. All improvements were regarded merely as innovations, and were looked upon with distrust, not to say contempt. Farm work was done in the old customary way, or if any change was made, it was only with a vague hope of gain. No sound principle was followed in either case.

Happily, those days have passed. Men of the hightest attainments in science now vie with each other in their efforts for the advancement of agriculture, and the practical farmer is ready and anxious to avail himself of their teachings. Mechanical ingenuity, too, has brought its tribute in the form of newly invented machines of inestimable value. Progress has fairly begun, and it must continue as long as the mind of man can devise and his hand can execute.

Fig 54. WOOD JOINTED BAR MOWER.

No one who has carefully watched this progress in Agriculture, for the last few years, can have failed to observe that it is constantly growing more scientific, though not, perhaps, less practical. Its standard is continually becoming higher. It is now the aim of all intelligent farmers to unite science and practical skill. These two powers are not antagonistic, but each will aid the other, and by their help we may make ourselves familiar with the mysteries of nature and remove the worst difficulties which have beset the farmer in his work. The thinker in his closet, the chemist over his crucibles, and the earnest experimenter in the field, are laboring together for the discovery of truth, and it is only by their united efforts that the highest truth can be obtained.

The tendency of the age is to change. All educational systems are changing. Scholastic and monastic education is vanishing, and even purely literary culture is waning to make way for more practical, more active, more scientific instruction, an instruction which shall have a more direct bearing upon the work of everyday life, and the time will, perhaps, come, when even the children in our common schools will be taught to recognize and to know by sight all the stones upon which they tread, all the plants, and animals, and reptiles, and birds, and insects which are to be found in their neighborhood, so that they will go better prepared to the higher schools of science. The study of nature, in a word, will lie nearer the foundation of our school system, and so permeate all our higher institutes of instruction till our literature becomes more agricultural in its character, for what branch of natural history is not linked and interwoven with the farm itself, and what better preparation could there be, for that practical training which our age demands? The time may, indeed, come, when mathematics, when geometry, when astronomy, will be taught by men who

are trying practically to draw lightning from the skies, and to devote knowledge to some use, rather than to the purpose of merely training the human mind.

Agricultural literature is, of course, utilitarian. It would be of little account if it were not. It is an important guide to develop the boundless resources of our soil, and it will always be valued as one of the most powerful aids to improvement in practice. Much of it may still be crude. We are groping along in the dark, but it is not difficult to see that a brighter day is dawning. Science and mechanic art are solving one problem after another; a better system begins to prevail, and we are led to hope that the time will come when we shall know practically and positively what we are to do, and how to do it, when every process of the farm will be conducted with greater certainty of results, when practice itself will have more of the exactness which is supposed to belong to the applied sciences.

It is the true province of agricultural literature to indicate the processes and to record the triumphs of science and mechanic art as applied to the promotion of agriculture, to bring to the knowledge of the farmer all the suggestions and discoveries of the chemist, the geologist, and the botanist, which can be useful to him, to make known the results of experiments by which new theories of culture are tested, and to show how the highest knowledge may be applied to the improvement of the common processes of agriculture, thus aiding the ceaseless struggle to meet the ever increasing demands of growing populations. It records both the failures and successes of the past, and teaches alike by both.

Take, for example, the principles of breeding. The stock grower needs to keep a clear and definite aim in view, and to understand the surest means of attaining it. The experience of any one man will go but a little way toward acquiring a

Fig. 55. AMERICAN HAY TEDDER.

knowledge of these principles. Indeed, a life-long experience, without the aid of the acquisitions of others, would fail to arrive at it. Now, we know, that vast achievements have been made in this direction. Long continued, extensive, and careful observation has established many facts, and discovered physiological laws from which sound principles have been deduced. Others, no doubt, still lie hidden from us, so that what we do not know, may far exceed the aggregate of what we know, but to ignore what has been fixed and acquired by laborious experiment and observation, would be like setting sail upon a vast and unknown ocean without chart or compass. Now these facts of vital importance to the interests of Agriculture must inevitably be lost unless recorded, and thus saved from oblivion, and Agricultural Literature has done this.

A faithful record of an experiment in Agriculture, well planned and carefully conducted, is a valuable addition to our stock of knowledge, and contributes to the substantial progress of the art. In this especially our modern agricultural literature differs from the ancient. The agricultural literature of the ancients, including that of Greece and Rome, extends over a period of more than eight centuries. In literary merit and in social estimation it may have excelled our own, but it is somewhat remarkable that in all these eight hundred years, which have transmitted to us many volumes of great interest and value relating to Agriculture, we seek in vain for any sign of real progress. We find a practice that is careful, exact, and saving, but it is the same, age after age; no new implements are adopted, no old custom abandoned for better. We may search every page, from Cato to Palladius, a period of nearly five hundred years, but there is no mention of any improvement in system or advance of any kind, and it is doubtful if the whole of that long period added as much to the real productive

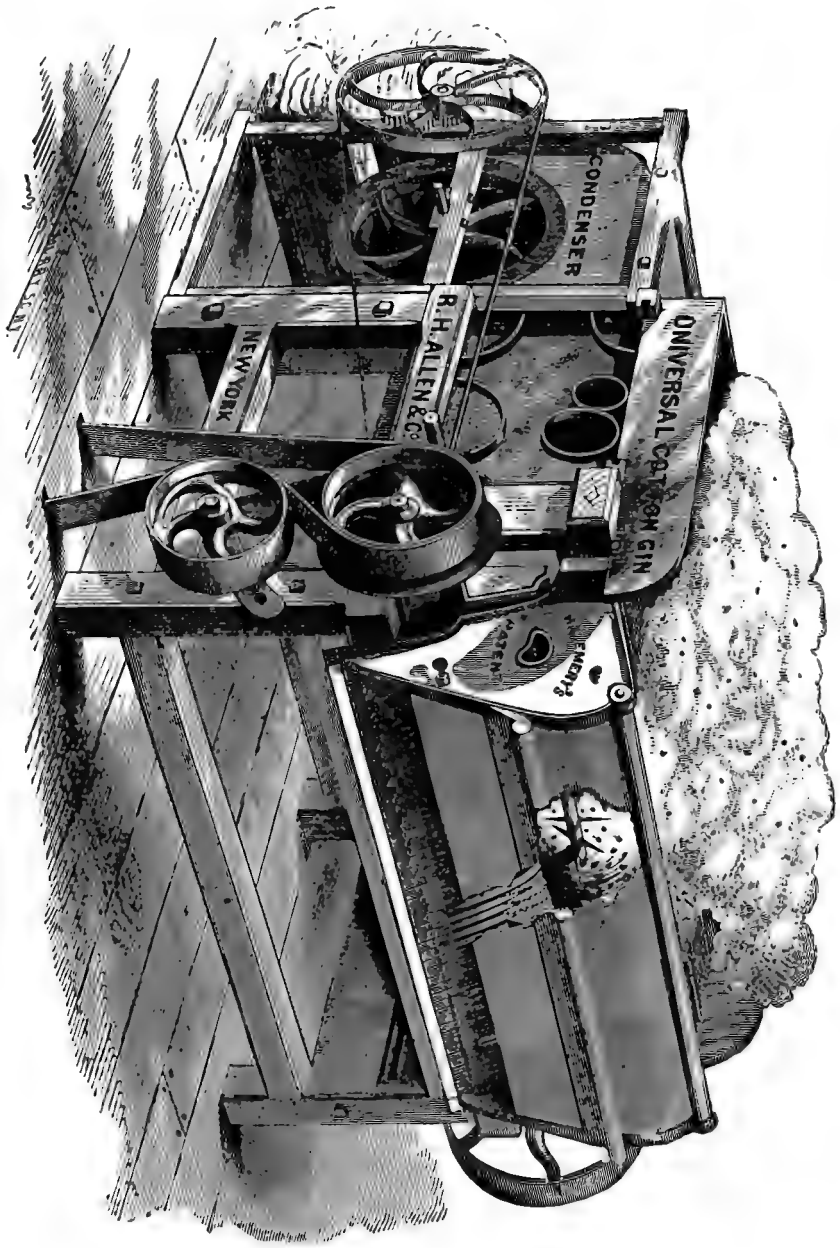
power of the farmer as has been gained within the last ten years of our own history.

In English agricultural literature, we find many marked and striking evidences of progress. This is especially true of the works of the present century. Within this time the minds of all have been awakened to a wonderful activity. Scientific men have developed important theories, which experience has proved to be true, while cultivators of the soil have done their part by careful observation, and discoveries have followed one another in quick succession. Every step, moreover, has been recorded. Every new machine invented, and every new process carried through to success, has been published to the world, and thus we have a multitude of works by which a flood of light is thrown upon every department of farm economy.

Scientific discoveries in Agriculture are the property of the intelligent farmer everywhere, and those made abroad have had a material and important influence in promoting the advancement of practical agriculture among us. No one who desires to be even moderately skilful and successful can dispense with the use of books relating to his calling. It is much to the credit of the present time that old prejudices against books upon farming, which are the recorded experiences of careful observers and experimenters, are fast giving place to a generous appreciation of the labors of the inventor, the chemist, the geologist, the entomologist, the botanist, and the practical man who tries experiments and records results.

For some years after the public mind, in this country, began to discard its narrow prejudice against the use of books on farming, we relied chiefly upon the mother country. English works on Agriculture were our only resource. These were not in all respects adapted to our climate, our soil, and our circumstances, and, notwithstanding their great value for many

Fig. 67.



purposes, their directions and suggestions often misled. Even when based upon sound practice, it was not a practice with which most of us were familiar, and hence it was far less valuable to us than if it had passed through the crucible of the practical American brain. The only means of removing these difficulties was the creation of an agricultural literature of our own; and this we shall accomplish by patient labor. We have begun to think, to experiment, and to record results. By the publication of agricultural periodicals and books, and by means of our agricultural societies, national, state, and local, the results of our labors are made known to all who care to learn them, and our agricultural literature is assuming the dignity and importance which it deserves as the instrument and aid of the most important material interest of a great and powerful nation, capable, from its extent and boundless resources, of becoming the granary of the world.

We do not mean to say that farming can ever cease to be practical, or that such a state of things would be desirable, if possible. But it is certainly becoming more a matter of study and science. No amount of information can do away with the necessity of hard work, but a knowledge of principles and the application of scientific laws is of the utmost importance to the farmer. When these are well understood, and when sound reasoning and close calculation are substituted for that mixture of tradition and guess-work, which once guided all farm operations, we may expect to lighten labor and shorten its processes while we continually increase its products.

Agriculture cannot be made profitable simply by securing good crops and abundant products; but it is necessary to take into consideration, also, the judicious employment of the capital invested, the expenses to be incurred, the wages to be paid the prices, and the varying state of the market. These matters

have a most important bearing on the general results, but they do not come directly within the cognizance of science, and actual experience is necessary for the solution of the questions continually arising in regard to them. He who depends wholly upon books, even if he be well read and have thoroughly mastered the general and well established principles of his occupation, may fail from want of this experience. But this is far from showing that no advantage is to be derived from well selected books. It is unreasonable to expect that tact and business ability can be obtained from any amount of study and reading. Experience itself does not always give them. To a great extent they seem to be intuitive and innate, and though familiarity with business affairs may sharpen the wits and quicken the perception, it does not always mature the judgment or create the skill which commands success in the market.

Practice and experience in the field should, therefore, be regarded as an essential part of an agricultural education. But the farmer should not, for these reasons, depreciate the aid he may gain from the man of science, the man of letters, or the faithful and accurate experimenter. The revelations of science will bring ever new and ever varied instruction to his mind. From year to year he may improve his practice, thus attaining greater and greater results; and no limit can be set to his upward progress. A simple record of experiments, carefully made and well described, will give him material for much improvement. By the exercise of judgment and discrimination he may separate the good and useful from what is of doubtful utility, and whatever he thus gets is so much positive gain. The actual results of an experiment are facts from which truth itself may be extracted. They are not mere vague conclusions, or the opinions or reflections of another, they are that which induced and enabled him to reflect.

It must be borne in mind that, as scientific investigation has advanced in modern times, it has brought its contributions to Agriculture from a great variety of sources, each of which brings something peculiar to itself. Chemistry has explained the composition of soils and manures. Botany has solved the mysteries of plant growth. Vegetable and Animal physiology have lent invaluable aid. Geology, Mineralogy, and, indeed, all the sciences, have done their share, and the farmer has only to use the knowledge so lavishly thrown out before him.

In considering the value and uses of a high standard of Agricultural Literature, it is not to be forgotten that it tends to create enthusiasm, and must exert a powerful influence to draw and to keep the young upon the farm, and to stimulate them to constant efforts to attain greater excellence and success. In this view, it is hardly possible to over-estimate the value and practical importance of well selected works on agricultural and horticultural subjects. When any one begins to read what has been written by others about any pursuit, and to reflect upon the facts and theories he finds stated, when he learns the results of investigations and experiments, and sees the labor and care bestowed upon them, he will soon become interested himself. As he proceeds his interest will grow into enthusiasm, and this enthusiasm will give him a love for his occupation and a strong desire to elevate it and attain a high position in it. Hence, he will gain vigor and energy which will insure success.

The young farmer, like other men, is subject to these influences. If he work in his calling with enlightened views, looking at its scientific and theoretical side while attending to its practical labors, he will acquire the strong interest in it, and love for it which is so essential to success. His enthusiasm will keep him upon the farm, and carry him through its

labors, and he will be able gradually to infuse into others the spirit by which he is himself animated. Enthusiasm is contagious, magnetic, and all powerful. If scientific investigation and well-written books on Farming and Gardening had done nothing more than create a love for rural pursuits, they would have rendered an invaluable service to mankind. This they have done already, and the feeling they have excited is constantly growing. We find to-day, in our farming community, a more earnest spirit of inquiry and more interest in agricultural pursuits than at any former period, and these alone will lead us steadily and surely to higher results.

And what an influence the progressive character of an Agricultural Literature has exerted in another direction! It has attracted the interest and awakened the kindliest sympathies of the wealthy and educated classes. Men who, by their energy and foresight, have acquired property or position, who once saw little in the hard realities of farm life but drudgery and mechanical routine, and looked with pity upon the farmer as one compelled to toil without intellectual culture, shut out, almost, from the amenities of life, have been led, by the fascination which this class of writings has for cultivated minds, to find in farming ample scope for the highest intellect, and problems worthy of the greatest efforts of human genius. This kindly sympathy has elevated the farmer in the social scale, given his occupation the character and dignity of an intellectual pursuit, and introduced him to a common brotherhood with men of culture, science, and social position. And so it should be. Agriculture is the mother of us all. "Agriculture feeds; to a great extent it clothes us; without it we should not have manufactures, we should not have commerce. They all stand together like pillars in a cluster, the largest in the centre, and that largest is AGRICULTURE!"

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

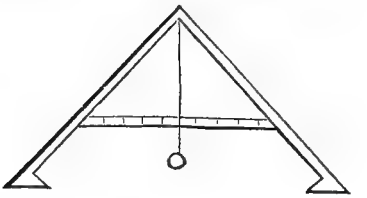


Fig. 6. THE SPAN.

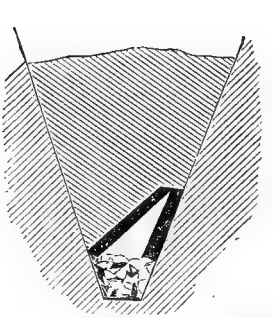


Fig. 7. STONE DRAINS.

Fig. 8.

HOW TO MAKE THE FARM PAY.

CHAPTER I.

DRAINING.

UNDERDRAINING will improve three fourths of the land now under cultivation in this country; and full one half will abundantly pay for the expense. Drainage deepens the soil, assists vegetation, lengthens the season for labor and vegetation, precludes the necessity for replanting, prevents the freezing out of winter crops, promotes the absorption of fertilizers, supplies air to the roots of plants, improves the quantity and quality of crops and tends to prevent drought. These are facts established beyond all doubt, by multiplied experiments in nearly every state in the Union. The lesson this reads to every farmer is, *Drain your wet lands.*

The best of all materials FOR DRAINS is the round or pipe tile. *See Figs.* 1 *and* 2. Sole tiles, *Fig.* 3, are more expensive and more difficult to lay, and not as good as the pipe tile. Horseshoe tiles, *Fig.* 4, should never be used. The pipe tile is improved by having a collar, *Fig.* 5; but this can be dispensed with by putting a thin piece of board or slate under and a strip of turf over each joint, to steady it until its position is secured. Where tiles are scarce and high, and stones are plenty, resort

may be had to stone drains, which, if properly constructed, answer a very good purpose.

Where peat can be had for the digging, very good tiles can be made from it. Brush drains hardly pay for the making, and open drains are, as a general thing, a disadvantage rather than an improvement, as the expense of digging is the same; they take up a large portion of the land, render farming operations difficult, afford a harbor for muskrats and other pests, are liable to be tread in, or prove pitfalls for cattle, promote the growth of rank grasses and noxious weeds, and must be dug over every year.

THE DEPTH OF DRAINS, of whatever material constructed, should never, in the Northern States, be less than three feet, and if the soil is easily worked, four feet, while in the Southern States, where the frosts do not penetrate the ground, the depth may be lessened to two and a half or three feet.

WHAT LANDS REQUIRE DRAINING, and how it shall be determined, are questions we must answer before going further. Evidently swamps, marshes, and all visibly wet lands, require drainage before they can be profitably cultivated. All high lands holding too much water at any season of the year, require drainage. Most useful plants are drowned by being overflowed, even for a short time, and injured by stagnant water about their roots. Lands in which planting is delayed in the spring, by reason of their wetness, require drainage. In the Northern States nearly two weeks may be gained by thorough drainage, an advantage which only those can appreciate who have been obliged to haul their manure over soft ground, plow their land when too wet, and then find the season too short to mature their crops, and all because of a surplus of cold water in the soil. Land on which water stands and freezes in the winter should be drained.

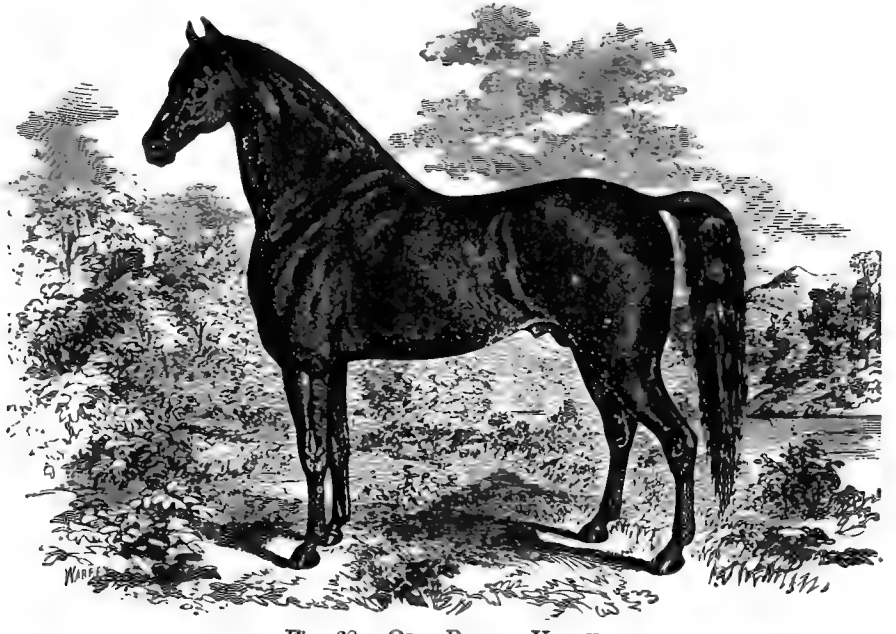


Fig. 68. OLD BLACK HAWK.

In all these cases, thorough drainage will abundantly pay.

As we have before hinted, nearly all land will be improved by drainage; for the expense is a permanent investment, a brush drain will last ten to fifteen years, a well laid stone drain twenty to forty years, and there is no reason why a perfect tile drain may not last one hundred years. In all this time the crops are improved both in quantity and quality.

A distinction can be made in view of crops to be raised, as land that is too wet for root or grain crops, may do admirably for grass, and it is often well to keep such lands permanently in grass, maintaining their fertility by top dressing or by occasional plowing and re-seeding in the fall. The indications of too much moisture are, in grass, the growth of rushes and weeds; if it be in grain, there will be frequent spots of sparse, low, and sickly looking stalks. Root crops, in too wet soils, instead of growing straight down plump and even, divide into numerous small fibres just below the surface. Our corn fields are yellow and sickly, and our cribs filled with nubbins from the effects of too much water in the soil.

Drains should be laid as far as practicable, directly down the slopes. A fall of three inches in one hundred feet, is all that is absolutely necessary, and this can be secured on almost any field, however level it may seem to the eye. The best means of determining the slope is with the span, *Fig.* 6. This may be made of lath or inch boards, and should be sixteen and one half feet wide at the base. When set upon a perfectly level floor, and the plumb line applied at the top the line will cross the bar in the centre, put a block just one inch thick under one foot and mark the bar where the line now crosses it, this denotes a fall of one inch to the rod. This operation repeated, if done with care, will give a sufficiently accurate measure for the whole work of laying out and constructing the drains.

Next determine carefully the number and position of the drains. This is the most difficult part of the operation. A few general rules will aid you. As far as possible the drains should run parallel with the inclination of the slope. When laid three feet deep they should be forty feet apart; in sandy or light soils, they should never be less than four feet deep, and may be sixty feet apart. If other lands drain into the field, there should be a three-inch drain at the head across the whole field with which the smaller drains should be connected. For convenience we will call these, *head drains*, or *headers* and sub mains or *minors;* and the large drain into which they all enter, the *main drain.* If there are marshy places lower than the stream into which the drainage must be carried, they may be drained into wells dug at their lowest points. If you have no outlet in your own field, after it is drained into one main drain, it may be carried under a highway or a neighbor's field to some outlet, without great expense. If possible, there should be but one general outlet for the whole system of drains, as the outlets are the most exposed portion of the whole work. Having determined the proper point for an outlet, the whole work can be directed towards this point.

Fig. 9 represents an irregular field, which it seemed impossible at first sight to drain thoroughly, and as it illustrates the general principles of drainage, we shall describe it in detail, A was a sluggish stream almost stagnant; at the bottom of the field, *b* a knoll some nine or ten feet in height, CC an entirely useless swamp, *d* the main drain laid about forty feet from the brook, EE the minor drains sixty feet apart, and entering the main drain at an angle to prevent obstructions, *ff* wells into which the northwest and southeast corners were drained. It was thought at first that the southeast corner could not be drained, but on applying the span, it was found that there was

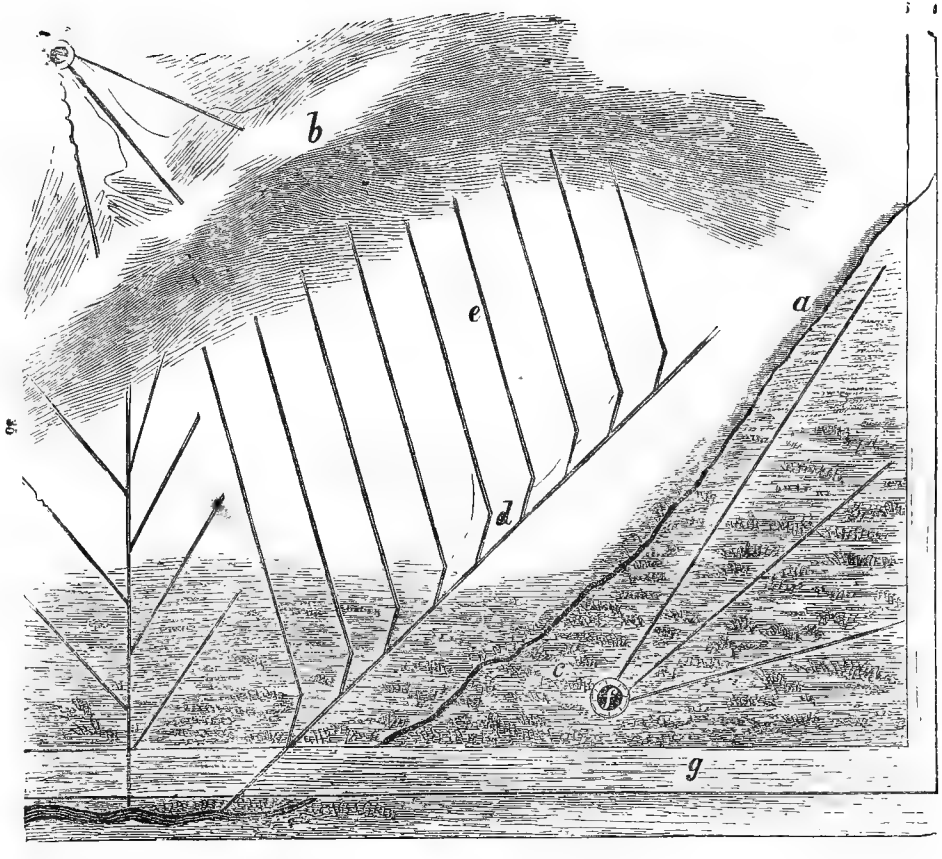


Fig. 9.

DRAINED FIELD.

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a Brook.

b Knoll.

c Swamps.

d Main Drain.

e Minors.

ff Wells.

g Highway.

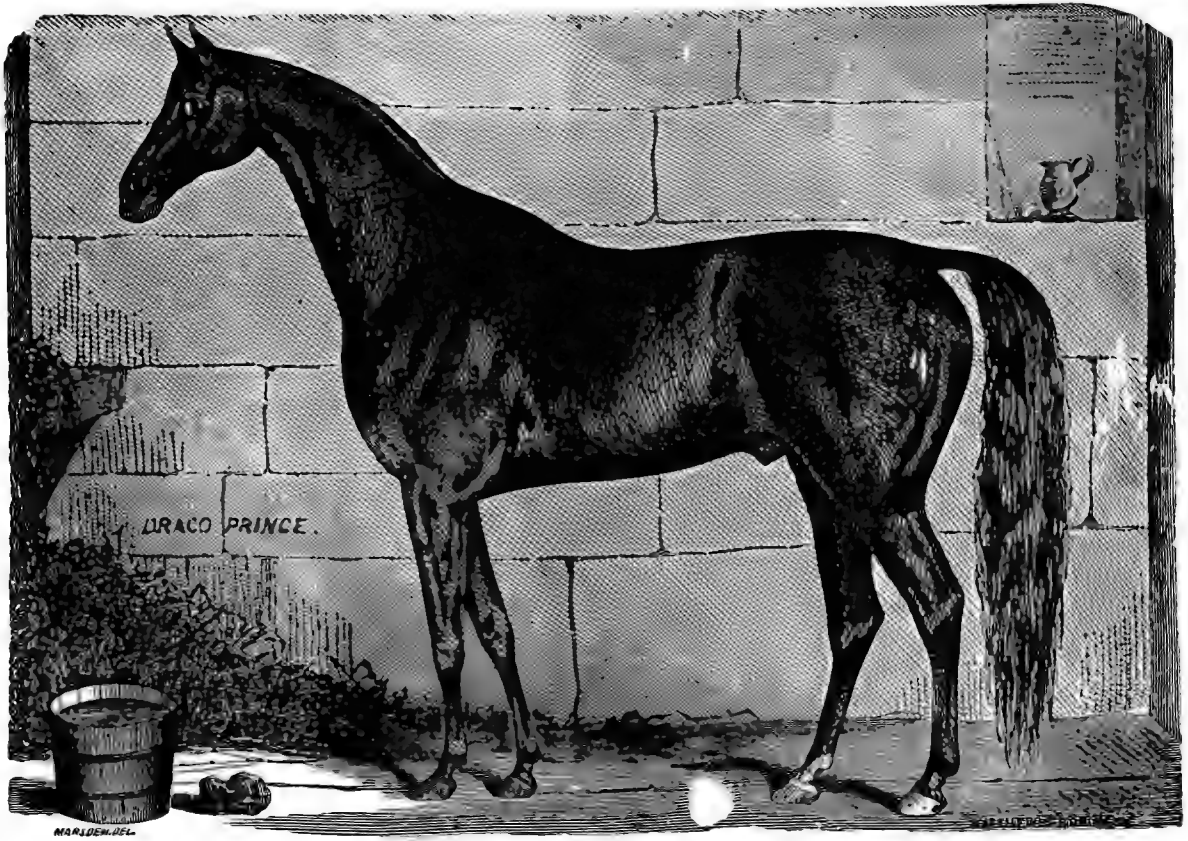


Fig. 69. DRACO PRINCE, owned by Jno. R. Poor, Somerville, Mass., is 7 years old, 16 hands high, weight 1070 lbs.—color black, and has trotted 2–25½.

a fall of six inches in one thousand feet, and by deepening the drains in the same proportion a fall of twelve inches was obtained, and during a very dry summer the well was dug and filled with cobble stones, and the minors connected with it. One drain which could not be connected with the main was carried under the highway, and connected with the brook at a lower point. The expense of draining this field of eighteen acres was,*

9600	1½ and 2 in.	pipe tiles at 15.00,	say 150.00
7400	4 in.	" " " 45.00,	" 150.00
		The expense in cash	$300.00

51 days, work of 4 men, 6 days, work of 1 yoke of oxen.

The stones used in filling the wells, were dug out of the drains, and thrown to one side for that purpose. Much of the work was done at odd spells during two years. The increase in the crop paid the cash expense in two years, and the drainage is a permanent improvement for fifty years to come. If a peat bog had been at hand, a substitute for the clay tiles could have been procured for less than half the above cash expense. After careful measurement the positions for the drains should be staked out.

In opening the drain, a plow may be run through both ways, to turn over the turf and loosen the soil, and a sub-soil plow may be often used to advantage for this purpose, unless pipe tiles without collars are to be used, when the turf should be carefully cut in sods and laid quite to one side, for use in covering the joints. A drain to be three feet deep, may be commenced two feet wide, while three feet will be necessary for a four foot drain. Excavation must commence at the outlet,

* Of course only a small proportion of the drains is shown in this figure, but enough to show the general principles adopted.

the main drain being the first dug and the last laid. For a stone drain, cut one side nearly perpendicular.

Figs. 10, 11, 12, 13, 14, represent a series of spades used in digging drains; the ordinary shovel and spade answers, however, for the first three feet, but a narrow spade, like *Fig.* 14 is very desirable in cutting the last foot, while the bottom is fitted for the round tile by an instrument like *Fig.* 15. The instrument represented in *Fig.* 16, is used for shaping the bottom of the drain for sole tiles. Any old shovel or spade can readily be transformed, by the nearest blacksmith, into the required shape, and a long handle completes the tool. Much time and labor is saved by using tools of the proper shape, while it is necessary that the bottom of the drain should be as nearly uniform as possible.

It is desirable that the main drain should be from two to four inches lower than the minors, in order that they may enter it from above, rendering it less liable to obstruction at the junction. The slopes of all the drains should be as regular as possible, which may be regulated by the use of the span, *Fig.* 6. After completing the trenches, laying the pipe and collar tile (*Fig.* 5) is a simple operation of fitting one over the other, commencing at the highest point in all cases. With simply the pipe tile a small bit of shingle, slate, or thin board, should be put under, and a sod of turf over each joint, to hold them in place and prevent their settling, or the loose soil washing in at the joints. The earth will soon harden so as to obviate the necessity. Care should be taken to place the openings as nearly opposite as possible, in order that there may be no obstruction to the water. (With an instrument like *Fig.* 17, tile can be laid very rapidly.) Joint tiles should be used at the junction of the drains. The most accurate measurements

Fig. 10.

Fig. 11

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

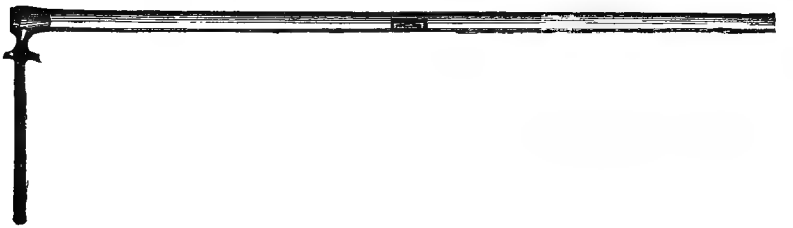


Fig. 17.

should be kept in order that the junctions may, at any time, be ascertained and readily opened should obstructions occur.

In covering the drain, the first foot of earth should be put in carefully, so that there may be no displacement of the tiles. Never fill in with stones, as is the custom with many. The water will enter at the bottom, and the water level be lowered to the bottom of the drain. In clay soils auger holes should be bored through the clay to some other soil at distances of not more than one hundred feet. If there is no header used, (*see Plate* 9,) the upper ends of the drains should be carefully protected with a brick or stone, in order that no soil may be washed in, and particularly that neither moles, mice, or snakes, may find lodgment in them.

Of stone drains, only two styles that we have ever seen, are worthy of consideration in these pages. In the one represented in *Fig.* 7, the bottom is filled with cobble stones for a few inches. These are packed in with the pestle, forming a pretty solid foundation. Flat stones are then set up against one side, which is cut nearly perpendicular, other flat stones are leaned against these from the opposite side, the joints being broken as in laying shingles. If the fall is made uniform, the cobble stones packed evenly and hard, and the joints well broken, these form very serviceable and durable drains. Where the stones are to be had for the drawing, they are often the most economical. *Fig.* 8 represents a drain made wholly of flat stones, and explains itself. Where the soil is firm, so that the stones will not be swallowed up, these make an excellent substitute for tile drains.

Where a peat bog is at hand, peat tiles may be made to answer the purpose of clay tiles. An open drain, from four to six feet deep, should be cut into the swamp for a short distance, and the surplus water removed. The upper surface

may then be removed to the barn yard, from twelve to eighteen inches of the top being useless for tiles. The simplest method of cutting out the peats is to lay out a plot, say twenty feet square on one side of the drain, then, with a sharp spade, cut this into strips, six inches wide from the drain, and these crosswise again eighteen inches long; then commencing inside the ditch cut out these peats at a depth of six inches. The peats will thus be six inches square and eighteen inches long, but will shrink in drying to about four by twelve inches. The inside of these peats must be hollowed out as soon as cut, and carefully laid out on boards to dry, with the hollow down.

Fig. 18.—Peat Cutter.

Fig. 19.—Peat Tiles.

An instrument for cutting peat tiles is shown at *Fig.* 18. This cuts the peats and hollows them at the same time, *Fig.* 19, and can easily be made from a stout piece of sheet iron. Drains are sometimes made by piling brush in the bottom of the trenches, and filling up with stones, but we doubt whether such drains last long enough to pay for the expense of ditching. They furnish a home to all sorts of burrowers, who soon obstruct them. This brings us to speak of the OBSTRUCTIONS TO DRAINS. As we have before hinted, all sorts of burrowers infest carelessly constructed drains. If the outlet is not protected, toads, frogs, snakes, muskrats, moles, and a host of

creeping things will soon take possession of them and render them worse than useless; but carefully protect the upper ends of the drain with bricks or flat stones, cover the joints with turf, or, in stone drains, with flat stones, and put an iron grating over the outlet, and you may feel pretty secure against obstructions. But the further precaution (as we have before stated) should be taken of accurately marking the entrance of each minor to the main, so that if there are obstructions their position may be ascertained. The outlet should be of stone so as not to be easily destroyed.

If it is nearly on a level with the bed of the stream into which it enters, a basin should be dug, in order that all sediment from the drain may be deposited in it and not set back into the drain. Care should be taken to have hard-burned tiles, as the crumbling of one tile will obstruct a whole drain, as will also a carelessly laid tile. Roots obstruct cobble stone and brush drains, but can hardly penetrate hard-burnt tiles or flat stones.

THE DRAINAGE OF SWAMPS sometimes requires very different treatment from that previously described. If the wettest part of the swamp is about the edges, a deep trench should be cut, not through the center, but around the outside, with an outlet at the lowest practicable point; after this drain has done its work of removing the surface water, shallower drains may be laid sixty to one hundred feet apart, and if the soil is clayey auger holes should be bored down to the gravel beds. These auger holes should be a little to one side of the current of the drain. Thus far, we have been instructing the farmer to construct drains, with the means always at his command; we now come to the description of the various DRAINING MACHINES in use in different parts of our country.

THE MOLE PLOW works well in stiff clay soils free from

obstructions. It consists of a long wooden beam and stilts, but, instead of the share, has a long, thin iron shank, at the bottom of which is a short, pointed bar of iron, two, three, or four inches square, as the nature of the ground permits. This machine can be dragged through clay at a depth of from three to four feet, by means of a capstan and chain and a pair of horses or oxen, or by putting on five or six yoke of oxen. It leaves a narrow channel like a mole run, whence its name. A somewhat similar machine has been used, (and, we believe, may yet be perfected,) which also draws in the tile after it. A short section of trench is first dug, and then the tiles are strung on a rope and drawn through after the plow, and then the rope removed. We believe this to be entirely practicable, and we urge the propriety of continued experiments upon our western prairies until the idea is brought to perfection. There are various machines which cut a ditch two feet deep, leaving the last half of the ditching still to be done by hand.

In many hard limestone soils, where a regular system of drainage is impossible, there are points at which wells might be sunk and filled with cobble stones.

If these wells reach a substratum of porous soil they will drain quite an extent of ground. Experiments are required to prove the practical economy of this system of drainage.

THE SIZE OF DRAIN TILES is an important consideration, as prices increase with the size. The common mistake is too large minors and too small mains. One and one and a half inches is ordinarily large enough for minors, unless they are of great length, when the first half may be one and a half, and the latter half two inches. As the slope increases the necessity for size diminishes. The mains should be able to carry off all the water brought by the minors. But here, it should be remembered, that one three inch pipe is equal to nine one inch pipes

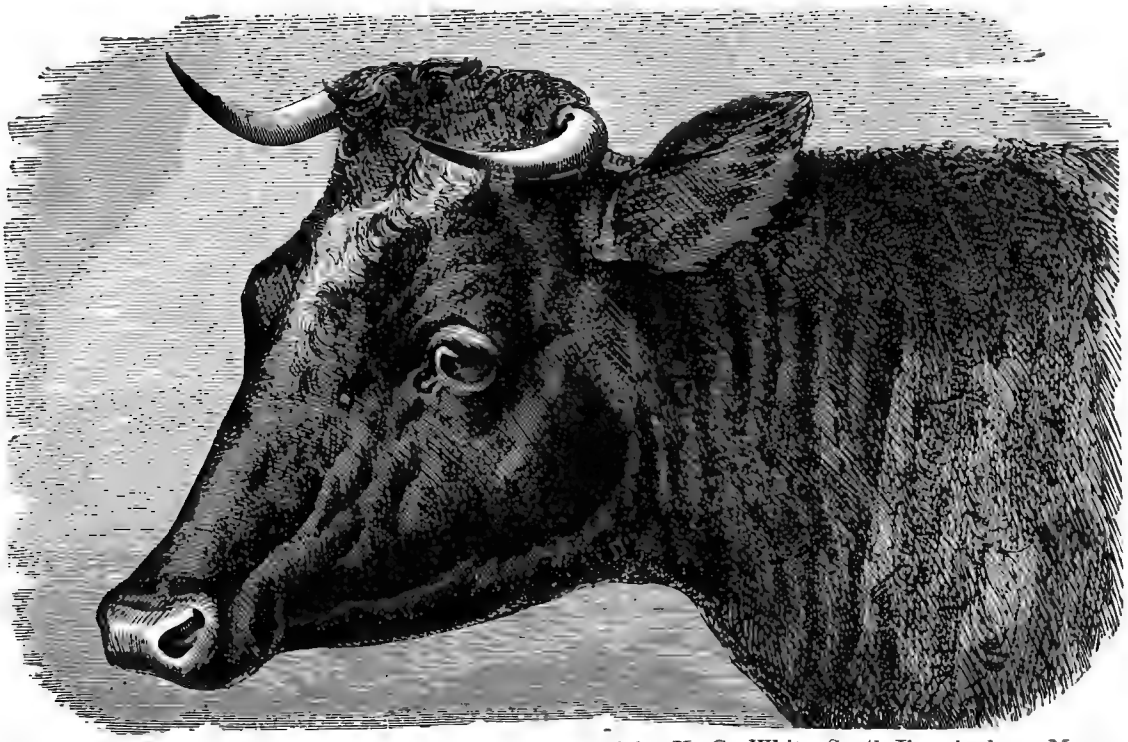


Fig. 71. Head of "AURORA, 2D,"—Shorthorn—owned by H. G. White, South Framingham, Mass.

in capacity That is, all the water that can be brought by six one and a half inch pipes will be carried off by one three inch pipe. Taking the plan, *Fig.* 9, the first six minors discharge into a three inch main, the next six into a four inch main or into a second three inch.

Elaborate tables are prepared, by some writers, to show how many gallons of water will be discharged per minute by different sizes of pipe, but they are of no practical value to the farmer, as it is impossible to calculate the amount of water that they will be required to discharge in any given time.

The following tables give the number of tiles required per acre:

TABLE No. 1.

Width between drains. Feet.	Length of drains. Rods.	No. of 13-inch tiles per acre.	No. of 18 inch tiles per acre.
20	132	2,011	1,452
30	88	1,341	968
40	66	1,006	726
50	52	805	581
60	44	671	484

TABLE No. 2.

No. of acres.	No. of feet apart.	No. of rods of drain.	No. of acres.	No. of feet apart.	No. of rods of drain.
1	20	125	11	42	691
1	30	88	11	45	655
1	42	62	21	21	2,640
1	45	58	21	30	1,848
11	21	1,382	21	42	1,320
11	30	968	21	45	1,232

That is, in one acre with drains twenty feet apart, there will be about one hundred and twenty-five rods of drain requiring about two thousand thirteen inch tile.

No. of rods of drain.	No. of 13 inch tile.	No. of rod of drain.	No of 13 inch tile.
40	610	80	1,219
50	762	90	1,371
60	914	100	1,524
70	1,067		

Table No. 1 shows how many rods of drain are required in an acre at given distances, and how many tiles of given lengths are required. Table No. 2 gives the number of rods of drain in fields from one to twenty-one acres, with drains from twenty to forty-five feet apart. Table No. 3 shows the number of thirteen inch tile required for any given number of rods of drain.

NOTE.—We desire to return our thanks to George Jackson, *Superintendent New York State Drain Tile Works*, for assistance in illustrating this chapter, and to recommend to the farmers of that section the superior hard burned tiles made by that Company.

CHAPTER II.

PLOWING.

THE objects of plowing are, to pulverize the soil, to mingle the different portions, to kill weeds, to cover manures, and to keep the surface open and fresh.

The plowing which accomplishes these objects best, is the best plowing. Pulverizing being the most important, that system of plowing which pulverizes the most thoroughly and the deepest is the best. Gardeners understand this, and where they wish to raise fine vegetables and plants, they work the soil thoroughly and deep. Do the same on your farms. If you have been plowing twenty acres four to six or eight inches deep, make it forty acres by doubling the depth of your plowing; it is better and cheaper than to buy twenty acres. It is less work to raise thirty bushels from one acre, than from two or three. We do not mean by this, that eight inches of the sub-soil is to be turned to the surface, but that it is to be stirred up and broken up where it lies, by means of sub-soil plowing. If made with the common plow, the change from shallow to deep plowing would have to be made very gradually, as it will not do to throw more than an inch or two of the subsoil on the surface at a time, but even by deepening one or two inches each year, an entire change would soon be effected in the productiveness of our fields. Stronger implements and teams will be needed, but the increase of our crops will soon compensate us for the outlay.

Nearly every farmer in the country has a new farm under the old one: indeed if the desire for more land could be changed to a desire for deeper land, the number of acres under cultivation would soon be doubled. Root crops especially need deep culture. Those who plow six or eight inches and never subsoil, have but little idea of the size to which carrots, turnips, etc., will attain, when they have room to reach down. Try it. There are two kinds of deep plowing; trench plowing and subsoiling The former often fails where the latter would be successful. Trench plowing is deep plowing, and turning the subsoil to the surface. This subsoil is often hard, cold, and wet, and it takes two or three seasons of manuring and cultivation, to render it productive. It is this kind of deep plowing which many have tried and condemned, for the reason above stated. But subsoiling is deep plowing and pulverizing, and stirring up the subsoil without raising it to the surface; this is always beneficial, except in the case of a very few sandy soils, with no basis of clay subsoil. Stiff clay soils are most benefitted by deep plowing after thorough draining, but when filled with water, any kind of plowing in such soils is nearly useless. A wet clay cannot be pulverized, any more than so much dough. After a clay soil is drained, it should be plowed *always* in the fall, in order that the action of the frost may pulverize it. The later in the fall the better. Trench plowing on such land through two inches of snow has proved to be the most successful plowing we have ever done.

There are four ways of plowing sod ground, known as lapped furrow slices, flat furrow slices, round furrow slices, and trenching. To make lapped furrow slices with the common plow, shorten the traces, so as to just clear the heels of the horses when turning round. Adjust the guide so that the plow will run level and true, directly after the team. After turning

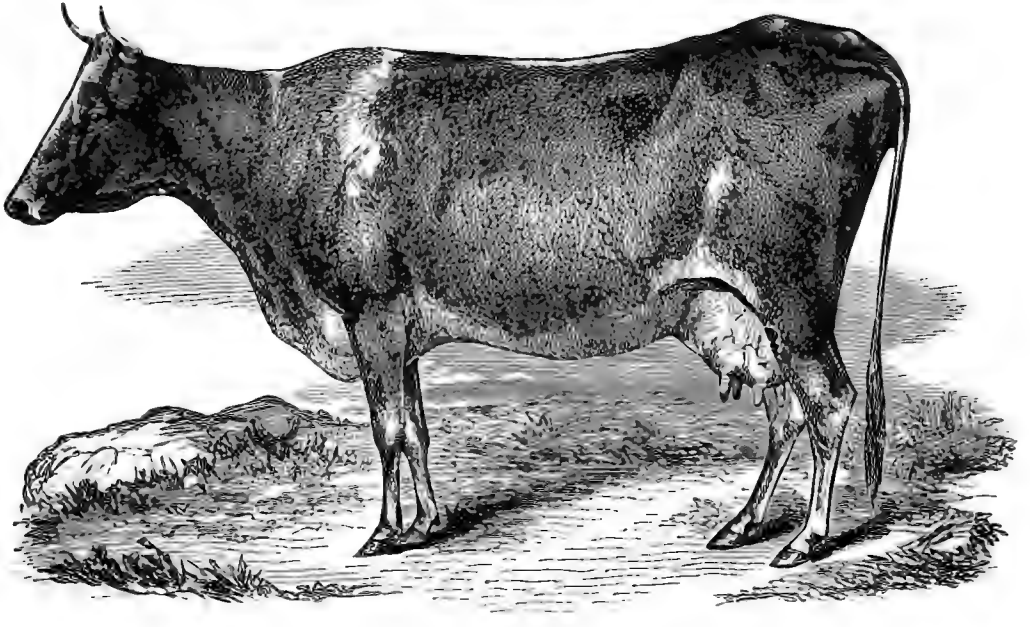


Fig. 72. "LADY MILTON"—Jersey—owned by J. C. Converse, of Arlington, Mass

the first furrow which will be flat, drive the team close to the furrow slice, and lean the plow handles to the left until the furrow slice will just lap on the first one turned; after one round has been plowed, the plow can be gradually adjusted to cut just as wide or as deep as required, although on new land good execution cannot be done at a greater depth than seven inches. If greater depth is desirable, a double plow is better.

For turning flat furrow slices, a plow with a narrow base and broad at the top of the mould board, is the most desirable. The coulter should be set so as to cut under; and the handles inclined a little to the right. The slices must be twice as wide as their depth. This style of plowing is most suitable for bushy, rooty, and obstructed pastures, or other grass lands, where the double plow cannot be used to advantage. Trench plowing is done by putting a skim plow forward of the main plow on the same beam, which removes a thin sod, and lays it upside down in the bottom of the furrow, while the main plow turns up ten inches or more of the undersoil. This sort of deep plowing should be decided upon with caution. Except in light sandy soils, trench plowing should be done late in the fall. On most soils, two inches deeper each year is enough. The exceptions are light soils underlaid with clay, and old worn soils.

Sod and Subsoil Plowing is done with what is commonly called the Michigan Sod Plow, (an illustration of which, with all the plows, etc., mentioned, is given in the article on Agricultural Implements,) consisting of two plows on one beam; the forward, or skim plow, cutting not more than three or four inches deep, and the rear plow lifting the under soil to the depth of six or eight inches, raising it up, and laying it over the sod, breaking the soil well, and leaving a clean channel for the next sod. For the deep breaking up of all sod land, free enough of obstructions, this is the best method of plowing.

How to Subsoil. If you have but one team, plow one furrow round the field, or such portion of it as you wish to plow; then hitch to the subsoil plow, and go round again in the same furrow. As the subsoiler does not raise the earth to the top, but only pulverizes it where it lies, it can safely be run as deep as your team can draw it. A span of horses, or yoke of oxen, will draw a subsoiler from eight to fourteen inches deeper than the first cut. In preparing orchard grounds, the subsoiler is often run eighteen to twenty inches deeper than the first cut. When the plow cuts a wide furrow, the subsoiler must be run twice in the same furrow. It is all the better to use the subsoiler also in cross-plowing. Subsoiling in this way, for two or three years, will mellow the ground for fourteen to eighteen inches deep, and the subsoil may then be turned to the surface by trench plowing. In subsoiling, you must keep a sharp eye on your plow. It is of little use to subsoil wet, heavy lands, until they have been under-drained. Many valuable acres would be added to our farms if we would underdrain and subsoil these lands, at much less expense than to buy new acres.

Underdrain as soon as possible, but until your drains are completed, plow your wet lands up and down the slope, in narrow divisions, sixteen to twenty feet wide—not with flat furrow slices, which give the land no chance to drain, but with lapped furrow slices. After these divisions are completed, run the plow as deep as your team can draw it through the middle furrows. Then, with a round-pointed shovel, throw out the loose dirt from them, and you have free channels for the surplus water to run off. It is not so much extra work as it seems, and will abundantly pay.

The time for plowing has been hinted at in the preceding pages, but we would say distinctly, here, that all hard, heavy soils, inclined to be lumpy, should be plowed in the fall as late

Fig. 73. "ABRAHAM,"—owned by the city of Boston.

as possible. The frost will pulverize the lumps, and the worms, hid in their winter quarters, will hardly have life enough to find their way back again. All soils, except light, sandy, or gravelly soils, that are already too porous, had better be plowed in the autumn.

Harrowing is fine plowing, and is only second in importance to it. The harrow is designed to complete the pulverization of the soils, and, as we have said before, the more completely this is done, the better, for many reasons, which we do not need to state. Be as particular to harrow, where the soil is in good condition, as to plow. Harrow your land until the lumps are gone. Lumps are as bad as stones. More so; for they hold plant food, that the plants will get at if the lumps are pulverized. If the harrow will not do it, roll it and harrow it until the object is accomplished. Use the roller also on light soils after spring plowing.

CHAPTER III.

MANURES.

NEXT to thorough draining, the great lack, in American farming, is a proper economy and application of manures and fertilizers. By manures, we mean that produced on the farm; and by fertilizers, guano, phosphates, and the like. And no farmer should buy any fertilizers until he saves and applies his manures. From extensive observation, we conclude that not one farmer in one hundred makes the most of his manures. The urine of a cow is as valuable as her dung; and not one farmer in one hundred saves it. The urine and excrement of each member of the family is as valuable as that of the cow; and yet it is not cared for.

Such waste of valuable food for crops cannot be too strongly condemned.

Our object, then, in this chapter, will be to show the farmer how to save and apply manure. And we begin where there is the most general and inexcusable waste—at the privy. The urine and excrement of each member of the family is abundantly sufficient to fertilize a half acre of land yearly. The simplest way to save this, where the vault can be opened, is to cover it with five or six times its bulk of peat or muck once a week. But a much better way, is to have a shallow vault, with a cemented or tight board bottom, sloping to one corner, from whence there should be an ample drain leading into a cesspool at convenient distance from the house. Into the upper corner

of the privy vault should run the drain from the sink, not only to save the washings of the sink, but also to keep the vault washed out, and to dilute the urine, which renders it more valuable. Of course, a brick or stone cesspool is the most durable, but an oil butt, or hogshead, sunk in the ground, forms an economical substitute. The place may be hidden from public view by a row of dwarf trees, pines, or spruces. Near it should be hauled peat, muck, leaves, straw—any kind of vegetable matter—and the contents of the cesspool poured on to it. For this purpose, a long-handled dipper may be constructed of a keg or firkin. When this heap is thoroughly saturated, fork it over, haul it away, and bring new material. Peat will absorb more ammonia than any other soil, and is therefore the most valuable for this purpose. The manure thus made will be worth more than the same amount of the best barnyard manure. Don't pay a dollar for fertilizers till you have made the most of this valuable matter right at your elbow. Proceed about it at once, for it is money wasting every hour before your eyes.

THE BARNYARD must always be the farmer's main source of supply for manures. And here, as in the previous case, the almost universal mistake is in the waste of the urine, the liquid manure. The urine of most animals is nearly, if not quite, as valuable as the solid manure; but it is usually allowed to go wholly to waste. And, more than this, it is allowed to carry away with it many elements of fertility from the solid manure. We protest, in the name of the hungry lands, against this waste of vegetable food, of the best quality. And we not only protest, but shall give practical directions for saving it.

Every farmer should soil his cattle in the stables or in the yard. A cow will produce about three and a half cords of solid and three of liquid manure; this, absorbed in twice its bulk

of peat or muck, makes twenty cords of manure worth from five to eight dollars a cord. This mixing can be done just as well in the yard, as to shovel the dirt in and out of the stables. All stables should have tight floors, and be so laid that the liquid will all run to one point, where there should be a manure well, which can be made by sinking a hogs head. The liquid is made more valuable by being diluted with water, and the stable-floors should be washed down occasionally with a few pailfuls of water. The barnyard should also be graded to one corner or to the centre, and another manure well sunk at the lowest point. Every barnyard should be surrounded on three sides by sheds with eave-troughs to carry off all the rain water, which would otherwise wash away the wealth of the yard.

Under these sheds, the solid manure of all the animals, together with the litter from the stables, with double its bulk of peat or muck, should be evenly spread every week, and the liquid manure from the wells dipped or pumped over it. Light troughs may be made to carry it from the pumps to any part of the yard.

The liquid manure is thus not only saved, but helps in the decomposition of the solid and prevents it from becoming heated or fire fanged. Manure thus treated will be doubled in quantity and doubled in quality. The yard should be kept well supplied with peat or muck. We repeat that no farmer can justify his purchase of fertilizers until he has used these simple and comparatively inexpensive means of increasing his home manufacture.

The Horse stable is especially apt to be the scene of this waste. The manure of the horse contains a large amount of ammonia, (which is the best of all fertilizers,) and less moisture than other manures, and is therefore much more likely to

neat and becomes fire fanged. When it becomes heated and mouldy its value is nearly all gone. It is hardly worth carting to the field. Horse manure should never be kept in a pile by itself, it should either be spread evenly with the other manures, or muck, and kept moist with the liquid from the manure well. Water and muck are the universal absorbents of ammonia, and should always be plentifully supplied to the manure heap.

The Piggery and Hennery should also be kept well supplied with peat or muck, which in the Hennery should be kept moist. The manure, both liquid and solid, of fattening pigs, being especially rich, should be especially cared for; enough soil should be shoveled in every day to absorb all the droppings; it should be protected from the rain and sunshine; and whenever practicable should be mixed with the barnyard manure before spreading.

The pig will work over the soil, pulverizing it and adding at the same time to each particle the most valuable fertilizing ingredients ready to be dissolved for the use of the plants; for it must be born in mind, that in the end nothing but liquid manures can be of any value to the plants. The roots can take up nothing but liquids. Every solid particle must be reduced to a liquid state before it will be available to the plants. Therefore the more thorough the decomposition of the manure the sooner and the more surely will it reach the plant; and the more moisture the manure absorbs the more readily will it dissolve in the soil and be taken up into the crops.

Barnyard manure, prepared as above, contains all the elements of nutrition needed by any crop.

It does not always contain them all in sufficient quantities for a succession of crops, and here is where the fertilizers come in as aids. But before discussing this subject we will speak of the application of manures to the soil.

The general principle of application is that manure sinks

into the soil, and the roots catch it and appropriate it on its way downward. Surface manuring is often very effective, and manure covered so deep as to be for the most part beyond the reach of the plants is valueless. It will never rise again to the surface, and is lost. Manure should be put, then, as nearly as possible where it is to do its work.

For light grasses it may be spread upon the surface and will soon reach the roots which are near the surface. Manure for this purpose should be as thoroughly pulverized and as evenly spread as possible, and applied in the fall before the frosts; if green manure is used, the unrotted straw, cornstalks, etc., should be raked off with a horse rake in the spring. We think this method gives the best results of any on light grass lands. Manuring such lands in the spring we have found to be very much less effective.

For nearly all other crops, manure should be well decomposed and plowed under, or thoroughly harrowed and cross-harrowed into the soil after plowing. No time can be set for applying manures, for every farmer has, more or less, to consult his own convenience as to the time.

Having reccommended fall plowing, we recommend, as far as practicable, fall manuring with green manure, as it is at present managed: but if we could persuade every farmer to adopt the system we have advised, of thoroughly composting his manures, under cover, with peat and liquid manures, often forked over, and thus ready at once to give up their fertilizing elements to the plants, we could say emphatically, manure in the spring, except surface manuring of light grass lands. This housing of manure through the winter is the best economy. By actual and oft repeated experiments we have proved that manure thus protected will produce double the crop that unprotected manure will. This is nearly all clear gain; there is

no more expense for seed or tillage, but little more for cartage; the only increase of expense is in harvesting double the crop. Pitching manure and forking it over is very laborious work, but if our plan of mixing with muck, and keeping moist, is followed, it will fork over much more easily, and in the spring will be so thoroughly decomposed that it will readily fall in pieces, and the labor, both of loading and spreading, will be much lessened. There will be no hard, dry lumps to be knocked in pieces, or left like pieces of brick to retard rather than aid the growth of the plants. Try it, if you are incredulous, on a small scale at first, and you will find in it a new source both of pleasure and wealth.

We wish here to say a few words about pitching and spreading manure. Use a long handled dung fork in loading manure, using the handle as a lever across the knee. In distributing it in the field, never dump a whole load in a place. Many small heaps are better than a few large ones. They should never be more than a rod apart. If the manure is left on the field through the winter, do not leave any where the heap stood in the spring, as enough fertilizing material will have washed into the soil at that spot. If the manure has been composted according to our plan, it can be very evenly distributed, in spreading; but if it has lain and dried hard, the laborer who spread it must go all over it a second time to knock the lumps in pieces. Once more we say, that, as the barnyard is the farmer's main source of supply, it is his bounden duty, as well as his greatest profit, to save and make the most of it. But there are many other materials on your farms that you must use before you can justify the purchase of fertilizers, and foremost among these is PEAT OR SWAMP MUCK. We shall use the term peat as covering swamp muck and marsh mud also. These are a valuable amendment to two entirely opposite kinds of soil, viz·

light, porous, sandy soils, and heavy, clayey soils. In the former the peat binds the soil together, acts as a sponge to hold moisture, manures, and gases for plant food, warms the soil by absorbing the sun's rays, while at the same time it cools more rapidly at night, and collects the dew so necessary to vegetation in hot weather. In clayey soils it separates the particles and renders them more porous. Its second source of value is as a compost with the manure of the yard. It absorbs and retains the ammonia, the most valuable element of manures; it also holds the moisture necessary to keep the manure heap from heating and becoming fire fanged.

By its use, and only by its use, the farmer is enabled to save the liquid manure. We do not hesitate to say that, properly composted with one half its bulk of solid and liquid stable manure, it makes an article each cord of which is equally valuable with any cord of the original manure.

The excavation and preparation, then, of the peat, is an important matter.

Every man's circumstances must determine the time and manner of getting out peat. The month of August, is all things considered, the best time. But most farmers will have to put it off till winter, as labor is cheaper, and there is less hurry with other matters on the farm. It should be thrown into a pile upon loose boards, and covered with loose boards, leaving it to the action of the air for several months before it is carted to the yard. An excavation should be begun at the border of the marsh in the autumn, and continued into it sufficiently wide for a cart path, and the muck thrown out in piles on each side. By the succeeding autumn this will be seasoned enough to cart away, and can sometimes be done on the surface, or waiting until the ground is frozen, can be readily hauled to the vicinity of the barnyard. It is better to get out enough at

one time to last for several years, and have it convenient for constant use.

RED CLOVER is one of the most convenient, effectual, and economical fertilizers that can be used for improving the fertility of an impoverished soil. Its long tap roots reach down into the soil, absorbing fertilizing influences that are beyond the reach of ordinary vegetation, and bringing them to the surface to form the stem and leaves. These roots make the soil more porous than before, and in decay leave a large amount of vegetable matter for the food of the succeeding crop. Its leaves absorb a large amount of ammonia from the atmosphere, and if plowed under at the proper time, this is all secured for the soil. For plowing under sow the large clover and plow it under when it is ripe, just as the blossoms begin to change color. Do not be tempted to cut the crop for hay. Lime or plaster should usually be sown with the clover in small quantities, and on many lands this is all the fertilizing that is needed. It is always an economical and valuable aid to the barnyard. On many barren hill-sides, red clover, plowed under, will effect a change in the soil which no other fertilizer could produce so quickly or so economically.

Every thing that can make manure should be saved. Leaves, litter, chip dirt, saw-dust, ashes, bones, waste salt, soot, should all be put into the compost heap. Soap contains a large proportion of fertilizing matter. In a barrel of good soft soap there is enough to produce a half a ton of good hay, or several bushels of grain. After this soap has been through the wash tub, it is more valuable than before. It is in the very best possible condition to be applied to the soil, yet it is usually suffered to run off into some slough hole or stream and wasted. Construct your privy vault on the plan we have advocated, and run the sink spout into it, for such waste is inexcusable.

Wood ashes is a very valuable manure, and much of it can be saved at home. They are nearly as valuable after being leached as before, if they are used immediately. The longer they stand after being leached the less valuable they become. They are most valuable for sowing on grass lands, and for cereal grains. They give stiffness and strength to the straw; one hundred pounds of ashes being sufficient for the production of three thousand pounds of good straw. When sown they should be a little wet, or else sown on a misty, damp day, or they will blow away. When used on potatoes they should be thrown evenly all around the hill, where they will reach all the roots. When sown on any root-crops, care should be taken to put as little as possible in contact with the leaves or stems. There is no danger of using too much ashes; but their use should always be accompanied by manure, muck, or the turning under of clover. Ashes mixed in the compost heap assist in the decomposition of elements, which would otherwise be useless, without destroying their efficacy. We, therefore, advise this method of application, except when sown on grasses and cereal grains. Ashes give compactness to light, sandy soils, and render heavy clay soils light and friable. About the best use to which ashes can be put on the farm, is in dissolving bones. Put a layer of ashes in the bottom of a barrel, then a layer of bones, then another of ashes, and so on until the barrel is full, then keep the ashes wet with soap-suds, but not wet enough to leach.

Never deposit ashes in any bin, box, or barrel, until more than a week after they have been taken from the fire. Many a barn and farm-house has been destroyed by neglecting this precaution. The bottom of a dry cellar is a good place to keep wood ashes, but a bin of brick or stone is better. If put out doors they should be at a distance from any building or fence,

Fig. 75. "FLORA,"—Ayrshire—owned by William Birnie, Springfield, Mass.

Fig. 76. "HONEST JOHN,"—Ayrshire—owned by William Birnie, Springfield, Mass.

and covered with loose boards. Most insurance policies are forfeited by keeping ashes in wooden vessels.

Bones are the very cream of manures. Our best crops are all the time going into bones. Some way should be contrived to get it back. There are large manufactories where bone dust is prepared, but the best part of the bone is boiled out, and the remainder is adulterated with shells, lime, plaster, marl, sand, etc., and sold for sixty dollars per ton. Never buy any of this stuff. Put a molasses hogshead in your back yard, cover the bottom with peat, muck, or mellow soil, cover this again with ashes four or five inches deep, into this throw all bones from the kitchen, and all that you can hire the small boys to collect for you at ten or fifteen cents a bushel. All the large bones should be broken before they are put in. When there are eight or ten inches of bones, cover them with ashes, then soil, or muck, then a thin spreading of plaster. Let this mass be wet with soap suds occasionally. The alkali of the ashes dissolves the bones, and the muck and plaster absorb the gases. Contract at the slaughter house for the skulls and other bones, and furnish a sugar hogshead to receive them.

When there is a large quantity they must be crushed by machinery, an ordinary grain mill with horses will grind one thousand pounds per hour. The ground bone of commerce sells for three dollars per hundred, and the bones a farmer would collect and grind would be worth twice as much. One hundred pounds of bones contain enough phosphate of lime for twelve thousand pounds of hay. The finer they are ground, and the more thoroughly they are mingled with the soil, the better.

Some farmers can secure spent tan bark near home, and at little expense. It should never be used on light or porous soils. The true way to use it is as a litter. It should be put under cover until dry and then spread in the stables, or the pig pen.

It will absorb and retain a large amount of liquid manure. It makes excellent bedding for all animals except sheep, as it gets into their wool. When used in the piggery it makes a most valuable top dressing for grass or grain. In the preparation of the soil for root-crops, tan bark prepared in this way will supply an abundance of those salts essential to their rapid and luxuriant growth. The same remarks apply to saw dust, turning shavings, planing mill shavings, etc. They should never be put into the stable wet.

The carcases of dead animals should never be left for the crows to pick. Cover the carcass six inches deep with muck, and allow it to decompose, which will take six months or a year. It may be placed within sight of the house, as, if covered thoroughly, the muck will absorb all the ammonia and other gases. Watch it a little at first, to see that dogs and crows do not uncover it. After having lain through a summer, fork over the mass, and throw out the bones, add a half bushel of plaster and another load of earth, and leave it another month or two; it is then fit for use and worth more than an equal bulk of barnyard manure. It should be spread very thin and well harrowed in.

Other green crops, besides clover, are turned in for manure, although we consider clover the best when it is to be turned in on the land where it is grown. Indian corn and buckwheat come next in value for this purpose. When fields are at a distance from the barnyard, this is often a most economical method of manuring. Four things must be observed in raising green manures. Those plants must be used whose seed is cheap; which are sure to succeed and grow very fast, which are deep rooted, and contain no substances which will be injurious to the succeeding crop. Usually five or six bushels to the acre of lime, plaster, or ashes, should be sown with the seed, or just before the crop makes its appearance on the surface. *Vetch* and

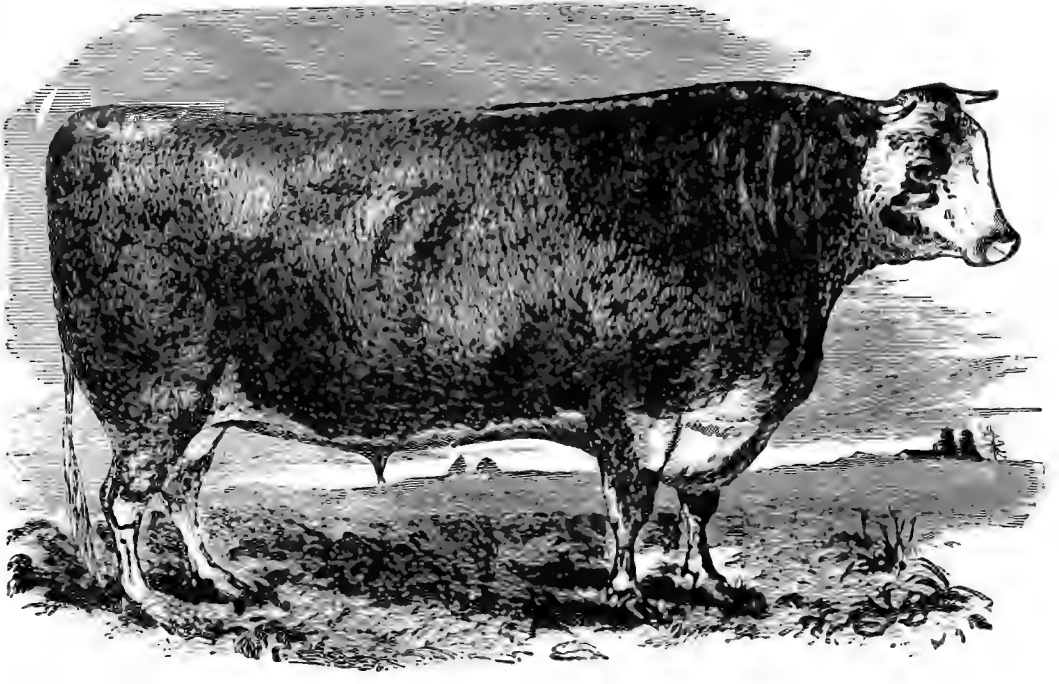


Fig. 78. HEREFORD BULL.

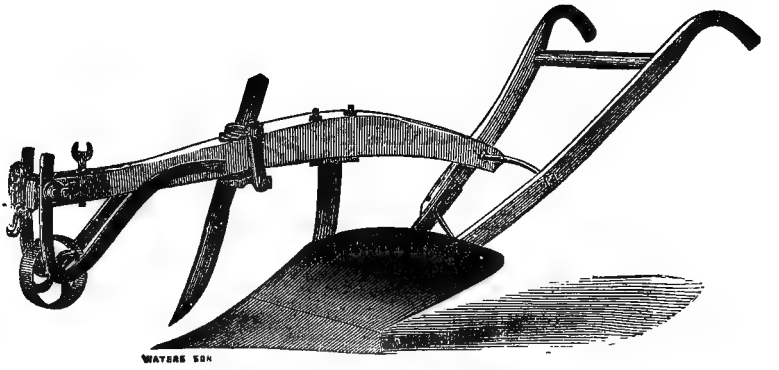


Fig. 34. COLLINS PLOW.

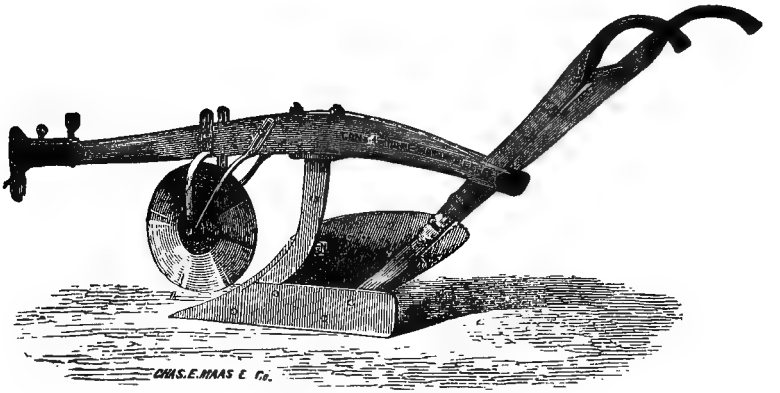


Fig. 35. COLLINS PLOW.

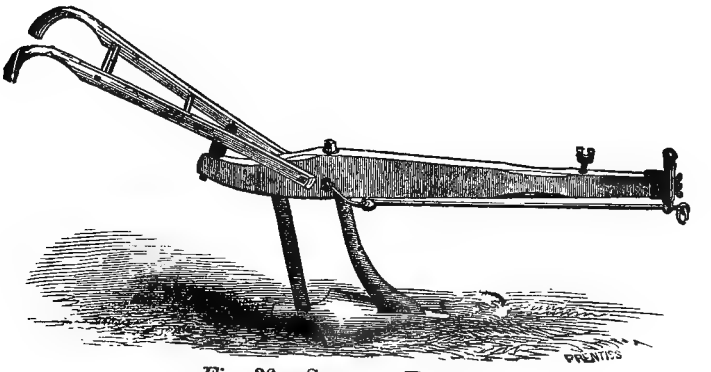


Fig. 36. SUBSOIL PLOW.

Dies ſind die Pferdehacken und Cultivatoren, welche bei der Zubereitung des Bodens und bei der Nachcultivation wichtige Dienſte leiſten. (Fig. 42.)

Eines der nützlichſten dieſer Geräthe iſt die von Knox patentirte und von der Ames Pflugcompagnie zu Boſton angefertigte Pferdehacke. Dieſelbe iſt dazu beſtimmt, Welſchkorn zu hacken und zu häufeln; desgleichen wird ſie bei allen Arten von Wurzelgewächſen, ſowie auch bei der Baumwollcultivation angewandt. Sie iſt ſehr leicht, läßt ſich von einem einzigen Pferde ziehen, pulveriſirt die Erde gründlich, jätet Unkraut und Gras aus u. ſ. w. Sie hat einen Vorderzahn oder Sech, während die beiden mittleren Zähne kleine Pflüge darſtellen, die ſich leicht von einer Seite nach der andern wenden laſſen und die Erde aus den Reihen oder in dieſelben werfen, je nachdem man es haben will.

Der häufige Grbrauch des Cultivators bei gehackten oder gedrillten Gewächſen iſt nicht genug zu empfehlen. Es iſt die leichteſte und ſchnellſte Methode, das Unkraut zu entfernen. Man behauptet, und wohl nicht mit Unrecht, daß ſich mit einem Cultivator und einem einzigen Pferd zehnmal ſo viel in einem Tage ausrichten laſſe als mit der Handhacke, und wenn der Farmer dieſe Maſchine öfter gebrauchte (bei trockenem Wetter etwa zweimal die Woche), ſo würde er durch eine verdoppelte Ernte reichlich für ſeine Mühe entſchädigt werden.

Der „Sulky Cultivator" (Fig. 43) iſt in den letzten Jahren ſehr populär geworden und wird ohne Zweifel in kurzer Zeit allgemeine Aufnahme finden, da ſeine Vorzüge bei der Cultivation des Welſchkorns in größerem Maßſtabe von Tag zu Tag mehr ſichtbar werden. Der Treiber ſitzt auf einem ziemlich hohen Bock, von welchem er ſeine ganze Arbeit überblicken kann, da die Vorderſchaufeln einige Fuß vor ihm angebracht ſind. Dieſe Maſchine wird von Dreere und Co. zu Moline in Illinois fabrizirt. Andere Modifikationen des „Sulky Cultivator" werden in andern Theilen des Landes angefertigt.

Der zackige Schollenzerdrücker iſt eines jener Geräthe, die ſich nur langſam die Gunſt des Publikums erworben haben, theils

wegen des hohen Preises, theils weil die Farmer die damit verbundenen Vortheile anfangs nicht zu würdigen wußten. Dennoch ist dieses Instrument, namentlich in der nassen Jahreszeit und bei steifem, scholligem Boden, kaum hoch genug zu schätzen. (Fig. 44.) Bei nassem Wetter ereignet es sich gar oft, daß der Boden sich nicht gehörig bearbeiten läßt. Die Erde ballt sich zu festen Klumpen an, die, wenn trocken, außerordentlich hart sind. Der Schollenzerdrücker ist dann völlig unentbehrlich.

Auch bei leichtem Land ist er oft mit großem Vortheil statt der gewöhnlichen eisernen Walze zu gebrauchen. Gleich der letztern werden die Theile gewöhnlich einzeln gegossen. Er pulverisirt die klumpige Erde und zermalmt die Schollen weit wirksamer, während er bei leichter Erde die obere Schichte compakt macht.

Cooper's Kalkstreuer.—Der Gebrauch des Kalks als Dünger ist in vielen Theilen des Landes, besonders in den Weizenregionen, sehr allgemein, und die Nothwendigkeit eines solchen Instrumentes leuchtet daher von selbst ein. Wir halten den Kalk für einen der wichtigsten Fertilizers, die wir haben, und die umsichtige Anwendung desselben kann nur von Nutzen sein. Er sollte frisch gelöscht und in feinem Zustand gestreut, und augenblicklich durch Eggen oder Pflügen mit der Erde vermischt werden. Am besten thut man, das Feld zuerst zu pflügen, sodann den Kalk in die Furchen zu streuen und letztern einzueggen.

Es ist eine schwierige und mühevolle Operation, den Kalk gleichförmig über einen großen Flächenraum zu streuen. Cooper's Kalkstreuer entfernt die Schwierigkeit und vernichtet die Arbeit mit vollkommener Gleichförmigkeit, wodurch sehr viel Zeit und Mühe erspart wird. Diese Maschine läßt sich durch Ochsen, Pferde oder Maulthiere ziehen, kann überall beladen und ohne Materialverschwendung auf das Feld gebracht und in wenigen Sekunden in Operation gesetzt werden. Die Quantität per Acker läßt sich leicht reguliren. Die Maschine wiegt nicht mehr als ein gewöhnlicher Ochsenkarren, trägt eine starke Ladung und zermalmt und pulverisirt alle Schollen. (Fig. 45.)

Ein Mann und ein einziges Gespann vermögen mit diesem Kalkaus-

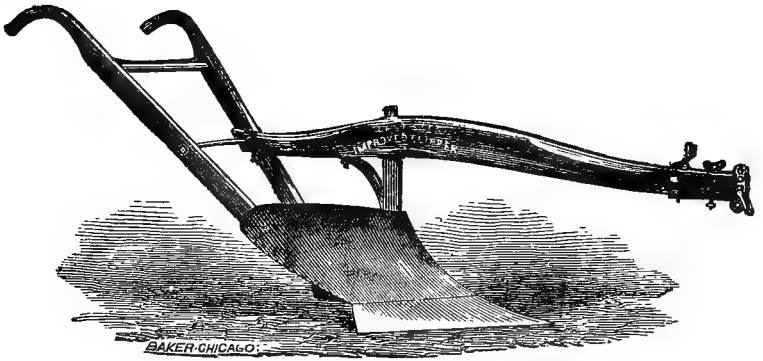


Fig. 37. DREER'S CAST-STEEL CLIPPER PLOW.

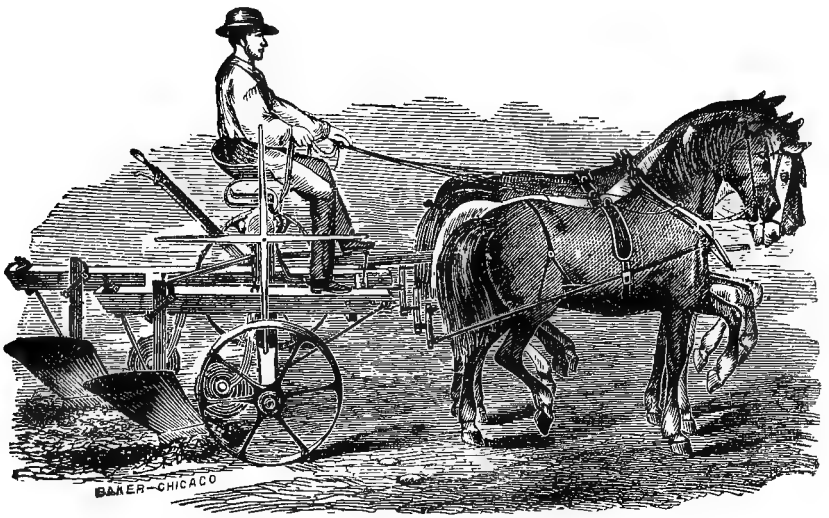


Fig. 38. SKINNER'S GANG PLOW.

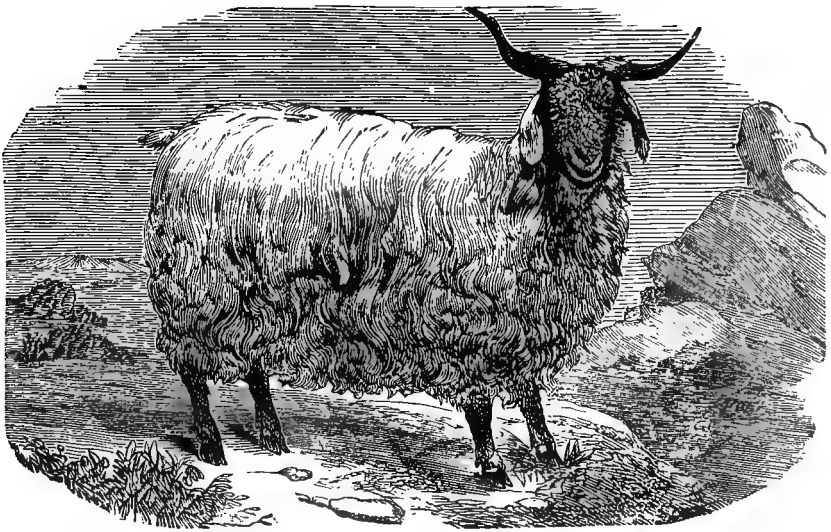


Fig. 91. CASHMERE DOE.

Fig. 92. SHEPHERD DOG.

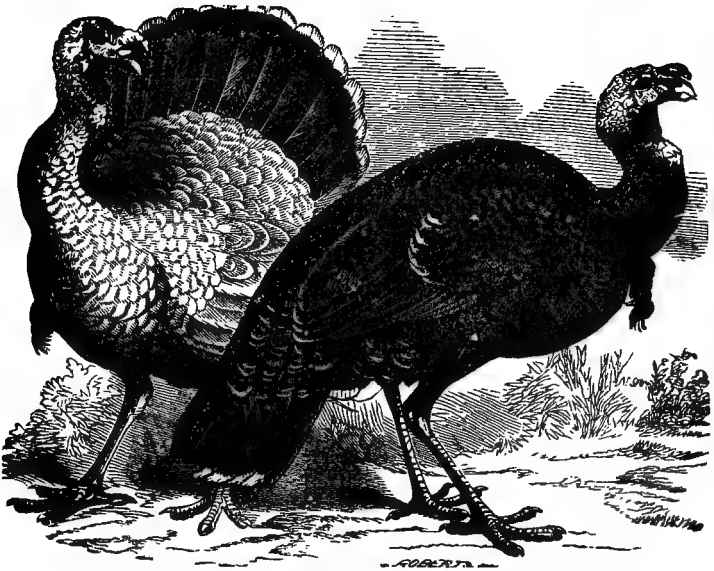


Fig. 107. BRONZE TURKEYS.

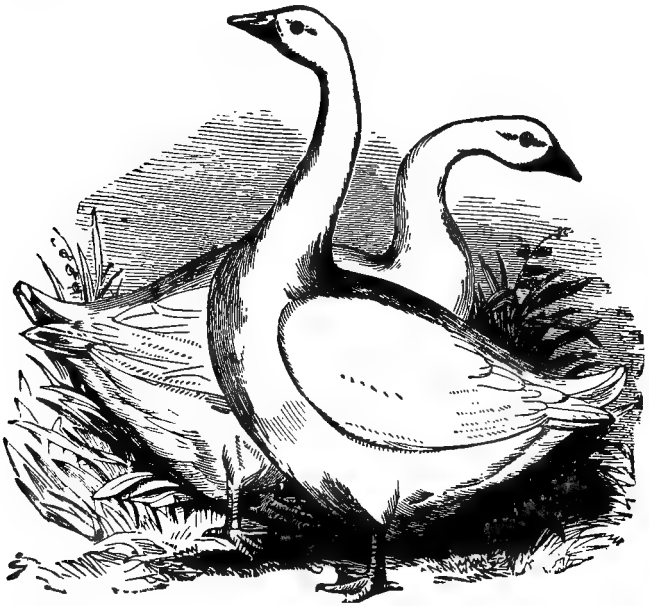


Fig. 108. BREMEN GEESE.

ſtreuer mehr zu thun, als vier Männer und zwei Geſpanne ohne denſelben. Außerdem wird der Kalk vollkommen gleichmäßig ausgeſtreut, was nie der Fall iſt, wenn es mit der Hand geſchieht. Die Maſchine iſt einfach und dabei ſehr dauerhaft, da ſämmtliche Theile aus Eiſen gemacht ſind. Auch kann man Aſche und Gips damit ausſtreuen.

Die Sterndrille.—Die Praxis, Weizenfelder zu drillen, iſt verhältnißmäßig neuen Urſprungs, allein die Vortheile derſelben ſind ſo einleuchtend, daß wenige Farmers in England daran denken würden, den Weizen mit der Hand zu ſäen, und auch in dieſem Lande haben die beſten Landwirthe dieſe Maſchine bereits adoptirt. Mittelſt der Drille kann der Same gleichförmig und bei trockenem Wetter ſehr tief geſäet werden. Wird er bei anhaltender Trockenheit (wie wir ſie oft zur Zeit haben, wenn der Winterweizen geſäet wird) mit der Hand ausgeſtreut und geegt, ſo kommt es häufig vor, daß er gar nicht keimt. Die Körner mögen die Feuchtigkeit bei Nacht abſorbiren, allein die glühende Sonne bei Tag trocknet ſie wieder aus, und auf dieſe Art wird das Keimen unmöglich.

Außerdem wird durch den Gebrauch der Sterndrille der Same bedeutend geſpart und auch dem Erfrieren im Winter vorgebeugt. Dieſe und andere Vortheile des Drillers ſind ſo einleuchtend, daß der Gebrauch dieſer Maſchine in nicht ferner Zeit allgemein werden muß.

Die Sterndrille wird von Ewell u. Co. in Baltimore, Maryland, fabrizirt. Sie vereinigt die Drille, den Cultivator und die Walze in ſich. Der Same wird durch eine ſich umdrehende Vorrichtung aus dem Behälter genommen, in die Furche geworfen und von dem nachfolgenden Pfluge bedeckt. Die Oeffnungen, welche in regelmäßigen Zwiſchenräumen an dem Diſtributor angebracht ſind, ſorgen für eine gleichförmige Zuſtrömung des Samens; die Quantität wird je nach der Tiefe dieſer Oeffnungen vermehrt oder verringert. (Fig. 47.)

Dieſe Maſchine kann, wenn es gewünſcht wird, auch als bloßer Cultivator gebraucht werden, da ſich die Walze und der Säeapparat abnehmen

Verschiedene andere Drillen werden in manchen Theilen des Landes fabrizirt, und alle sind dem Zwecke angemessen, weshalb wir ihren Gebrauch auf allen Getreidefeldern nicht genug anempfehlen können.

Säemaschinen.—Es wurden verschiedene kleinere Säemaschinen für Gartenzwecke und dergleichen erfunden und eingeführt. Im Prinzip sind sie einander ziemlich gleich, obschon einige ohne Zweifel wirksamer sind als andere. Wir nennen hier nur die von G. E. Herrick zu Lynnfield Centre, Mass., angefertigten „Verbesserten Danvers Säemaschinen." (Fig. 48 und 49.) Dieselben empfehlen sich durch ihre einfache Construktion und Billigkeit — Vorzüge von Wichtigkeit, da sie ihnen in vielen Gegenden Aufnahme verschaffen werden, nach denen eine kostspielige Maschine ihren Weg nicht finden würde. Sie säen Zwiebel, Rüben und dergleichen mit so großer Gleichförmigkeit wie irgend eine andere Maschine, die wir je geprüft haben.

Gäthacken.—Das erste amerikanische Patent für verbesserte Hacken wurde im Jahr 1819, und für Gußstahlhacken im Jahr 1827 ertheilt, obgleich Gußstahlhacken schon 1823 von zwei Etablissements in Philadelphia angefertigt wurden. Die Manufaktur dieser und anderer kleiner landwirthschaftlicher Geräthschaften hat seither einen ungeheuren Aufschwung genommen und beschäftigt eine große Anzahl Personen. An Leichtigkeit, Stärke und Dauerhaftigkeit stehen die amerikanischen Hacken unerreicht da.

Allen's Gäthacke ist ein einfaches, aber wirksames und werthvolles Instrument, das von G. P. Allen in Woodbury, Connecticut, erfunden wurde. (Fig. 50.) Sie hat eine Anzahl verbundener Schaufeleisen, die sich zwischen den Pflanzenreihen vorwärts und rückwärts arbeiten lassen. Für Gartenarbeit und zum Reinigen der Gänge ist dieses kleine Instrument äußerst werthvoll. Die Zickzackschneide der Klinge macht die Operation sehr wirksam und gätet das Unkraut gründlich aus.

Geräthschaften zum Einheimsen. — Bei Weitem die wundervollsten Improvements, die bei den modernen landwirthschaftlichen Geräthschaften stattfanden, finden wir indessen bei den zum Einheimsen

Fig 136.

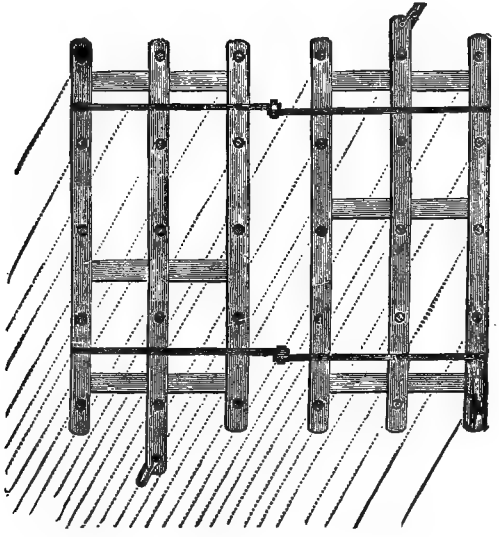


Fig. 40. IMPROVED HINGE HARROW.

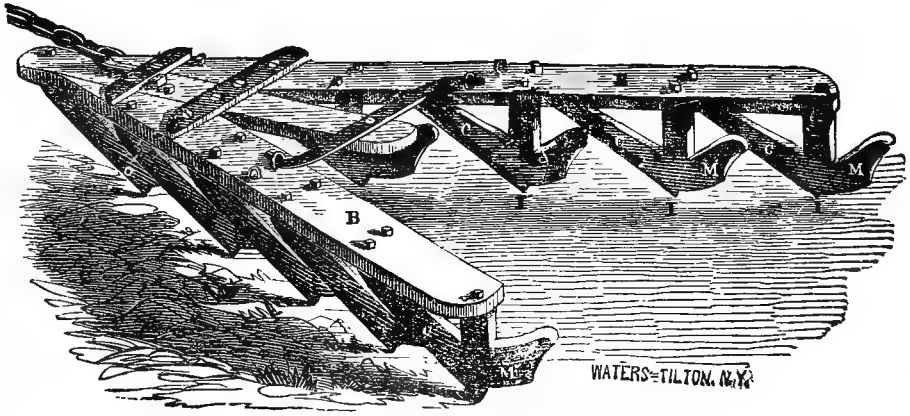


Fig. 41. SHARE'S HARROW.

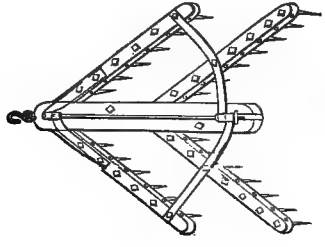


Fig. 39

GEDDES' HARROW.

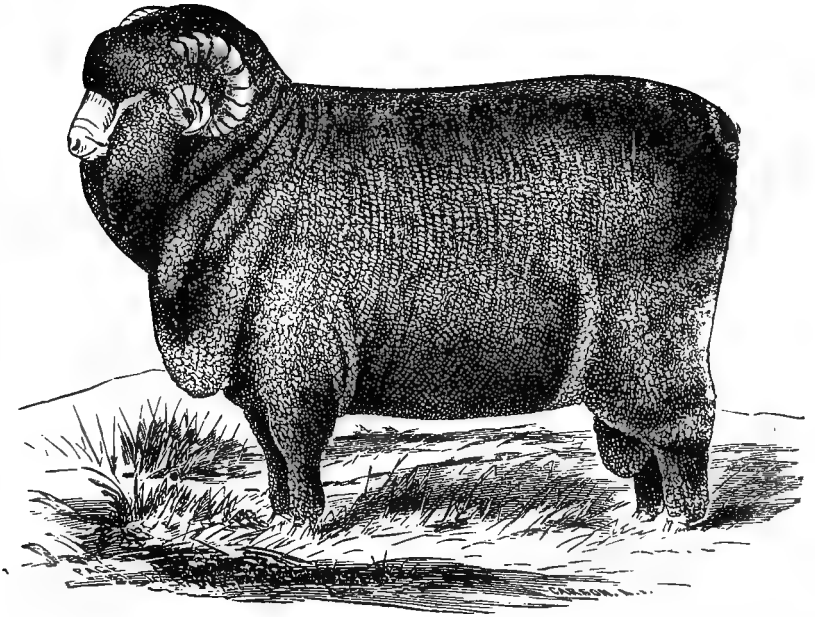
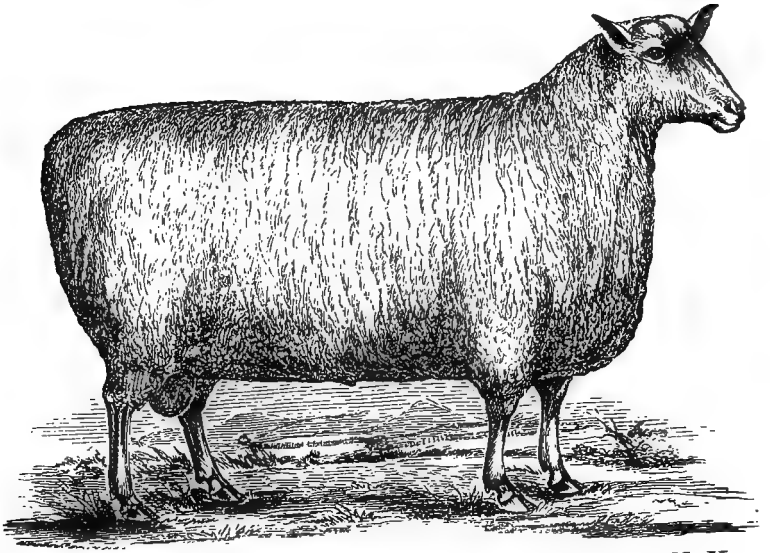


Fig. 81. MERINO RAM.



LEICESTER RAM. Owned by Jurian Winne, of Albany Co., N. Y.

der Feldprodukte gehörigen Inſtrumenten, beſonders bei den zum Mähen und Schneiden erforderlichen. So wichtig ſind dieſelben für das Wohl der Geſellſchaft geworden, daß ihr plötzliches Verſchwinden eine Erſchütterung im Gefolge hätte, welche von der ganzen civiliſirten Welt verſpürt werden würde. Und doch ſind kaum fünfzehn Jahre verfloſſen, ſeit die praktiſche Oekonomie der Mäh- und Schneidemaſchinen anerkannt wurde und ihnen allgemeine Aufnahme verſchaffte.

Die Zahl der vor dem Jahre 1850 im Gebrauch geweſenen Mähmaſchinen belief ſich kaum auf fünftauſend. Ketchum's Mäh- und Huſſey's Schneidemaſchinen waren die Pioniere und thaten mehr als alle früheren Patente, um der Welt klar zu machen, daß das Gras und Getreide endlich durch Maſchinerie eingeheimſt werden würden. Dennoch wollte die Mehrheit der Farmers, welche der im Jahre 1848 zu Buffalo ſtattgehabten Ausſtellung der Agrikultur-Geſellſchaft des Staates New York beiwohnten, als Ketchum's Mähmaſchine die Probe ſo glänzend beſtand, nicht zugeben, daß dieſelbe ihre Arbeit ſo gut verrichtete wie die gewöhnliche Handſenſe. Bei geradem, grobem Graſe, meinten Einige, möchte ſie vielleicht tauglich ſein; für die feineren Grasarten aber wäre ſie durchaus unpraktiſch.

Bei der im Jahr 1852 von derſelben Geſellſchaft zu Geneva veranſtalteten Probe der Mäh- und Schneidemaſchinen concurrirten ſieben der erſteren und neun der letzteren mit einander um den Preis; allein nicht mehr als zwei oder drei Mähmaſchinen verrichteten ſo gute Arbeit wie die gewöhnliche Senſe, und keine einzige vermochte, wenn ſie im Gras zum Stehen gebracht wurde, ihren Weg fortzuſetzen, ohne zuvor eine Strecke weit zurück geſchoben zu werden, um den erforderlichen Anſatz zu gewinnen.

Sämmtliche Maſchinen neigten ſich ſchwer nach einer Seite hin, ſo daß die Thiere nicht wenig abgemattet wurden. Keine einzige vermochte ſich raſch umzuwenden, und alle riſſen bei der Operation den Raſen auf. Die alte Manning- und die Ketchum-Maſchine waren die einzigen, welche ihre Arbeit befriedigend verrichteten.

Einige Schneidemaſchinen (die von Burrall, von Manning, und von Seymour und Morgan) erwieſen ſich tüchtig, und die Preisrichter erklärten, daß ſie im Vergleich zu den alten Schwadenſenſen achtundachtzig und drei Viertel Cents per Acker erſparten. Hier war alſo ein Gewinn, ein poſitiver Fortſchritt. Dennoch aber verrichteten die meiſten Schneide- ſowohl wie Mähmaſchinen nur mittelmäßige Arbeit, und bei allen wurden die Thiere furchtbar angeſtrengt.

Im Juni deſſelben Jahres (1852) bewarben ſich zwölf Schneide- und etliche Mähmaſchinen bei der von der landwirthſchaftlichen Staatscommiſſion von Ohio veranſtalteten Probe um den Preis, unter andern die von McCormick im Jahr 1834 und die von Huſſey 1833 patentirte; allein nach dem Bericht der Preisrichter ſchien keine der verſchiedenen Maſchinen eine entſchiedene Superiorität an den Tag gelegt zu haben.

Die Wichtigkeit dieſer erſten Verſuche, die einer erfolgreichen Operation der neuen Maſchinen im Wege ſtehenden Schwierigkeiten zu überwinden, wird uns hinlänglich klar werden, wenn wir bedenken, daß jährlich mehr als zwanzig Millionen Tonnen Heu in dieſem Lande produzirt werden, und daß die Gras- und Heuproduktion die wahre Baſis unſerer Agrikultur iſt, denn ohne dieſelbe können wir in unſerm nördlichen Klima kein Vieh halten; ohne Vieh aber hätten wir keinen Dünger, ohne Dünger keine Brotſtoffe. Da wir genöthigt ſind, unſer Vieh fünf bis ſechs Monate im Jahr im Stall zu füttern, wozu wir hauptſächlich auf das Heu angewieſen ſind, ſo leuchtet es von ſelbſt ein, daß dieſes Produkt eines der wichtigſten iſt und von dem Landwirth gebührend berückſichtigt werden ſollte

Von jener Zeit an bekundete der Erfindungsgeiſt dieſes Landes eine außerordentliche Thätigkeit. Die Patente begannen ſich zu vermehren, und das raſche Wachsthum dieſes Manufakturzweiges nahm vom Jahre 1855 an unausgeſetzt ſeinen Fortgang.

Um die Vorzüge der verſchiedenen Maſchinen zu prüfen, wurden faſt jedes Jahr in verſchiedenen Theilen des Landes öffentliche Proben veranſtaltet; allein fünf Jahre nach der Verſammlung zu Geneva äußerte

Fig. 79. MERINOS.

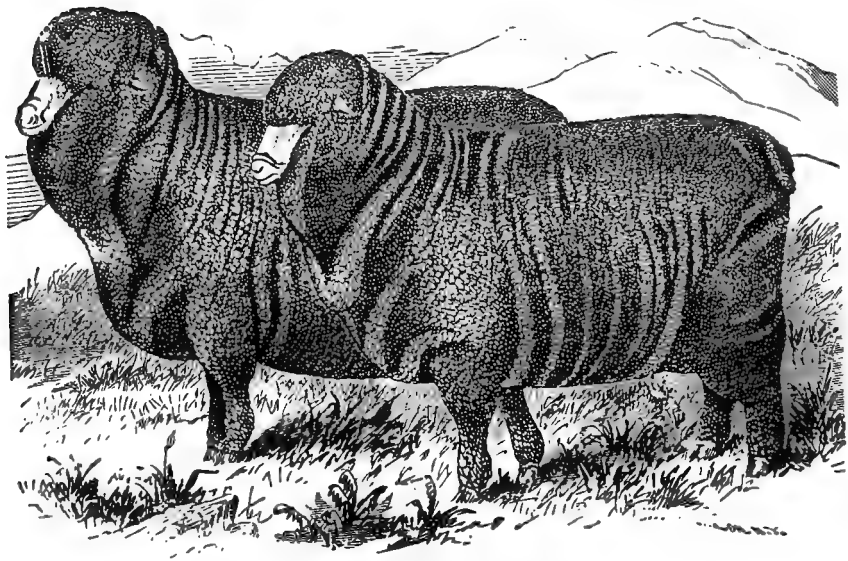


Fig. 80. MERINO EWES.

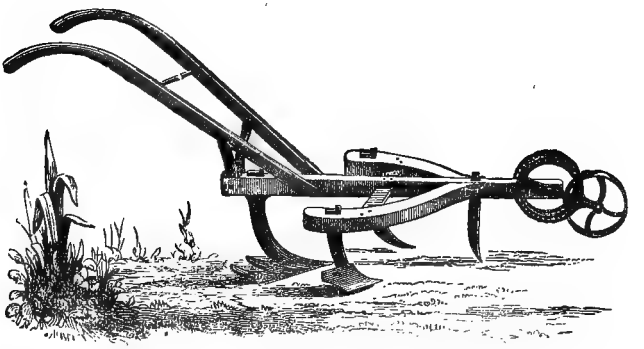


Fig. 42. KNOX'S HORSE HOE.

Fig. 43. DREER'S SULKEY CULTIVATOR.

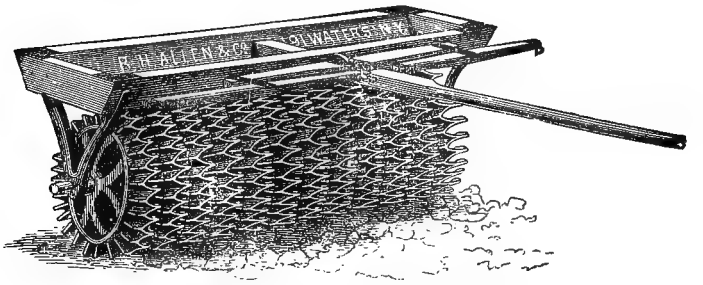


Fig. 44. ALLEN'S CLOD CRUSHER.

sich allerwärts der Wunsch nach einer zweiten allgemeinen Probe, die sämmtliche hervorragenden Mäh- und Schneidemaschinen des Landes zusammen bringen sollte. In Folge dessen hielt die Agrikultural-Gesellschaft der Vereinigten Staaten im Jahr 1857 eine Nationalprobe zu Syracuse, im Staate New York. Hier wurden mehr als vierzig Mäh- und Schneidemaschinen registrirt und auf dem Felde zusammengebracht Seit der Versammlung zu Geneva hatten merkwürdige Improvements stattgefunden. Bei den meisten Maschinen hatte sich der Schwergang bedeutend vermindert, obgleich bei einigen dieser Uebelstand noch immer groß genug war. Die meisten bekundeten einen großen Fortschritt in ihrer Fähigkeit, feines und grobes Gras zu mähen, ohne in Stockung zu gerathen; die zwei Maschinen, die in Geneva den höchsten Preis errungen hatten, standen auch hierin obenan; von den neunzehn Mähmaschinen, die diesmal um die Krone rangen, vermochten nur drei in feinem Gras zu operiren, ohne zurückweichen zu müssen, um einen Ansatz zu gewinnen. Die im Jahr 1856 patentirte Buckeye Maschine errang hier ihren ersten großen Triumph und erhielt den ersten Preis.

Neue Erfindungen und Improvements folgten nun jedes Jahr rasch auf einander. Im Jahr 1859 wurde die berühmte Wood Mähmaschine erfunden, die sich in kurzer Zeit mächtig Bahn brach. Im Jahr 1864 gab es in diesem Lande nicht weniger als einhundert und siebenundachtzig Etablissements, in denen Schneide- und Mähmaschinen fabrizirt wurden. Einige dieser Etablissements waren von großem Umfang, massiv gebaut, mit starker Dampfkraft, der besten Maschinerie und den feinsten Instrumenten versehen, und das ganze Geschäft war umsichtig und praktisch systematisirt worden. Ueber sechzigtausend Personen fanden in diesen Fabriken Beschäftigung. Der Werth der jährlichen Produkte überstieg die Summe von fünfzehn Millionen Dollars, während die Zahl der Maschinen, die fertig aus diesen Etablissements hervorgingen, sich auf ungefähr einhunderttausend belief.

Neun Jahre nach der Probe von Syracuse wurde es für wünschenswerth gehalten, eine neue zu veranstalten, die in ihrem Charakter völlig

national ſein ſollte, und bei der ſich Maſchinen aus allen Theilen der Union zum Wettſtreit einfänden. Dieſe Probe wurde deshalb unter den Auſpizien der Agrikultural-Geſellſchaft des Staates New York arrangirt und im Juli 1866 zu Auburn abgehalten.

Die Zahl der einfachen und combinirten Mähmaſchinen, die regiſtrirt wurden, belief ſich auf vierundvierzig, die der Schneidemaſchinen auf dreißig; es waren ſomit im Ganzen vierundſiebzig Maſchinen regiſtrirt. Im Vergleich mit den neun Jahre zuvor in Syracuſe ausgeſtellten Maſchinen bekundete ſich in jeder Hinſicht ein großer Fortſchritt. Die Mähmaſchinen waren compakter, einfacher in ihrer Conſtruktion, leichter, dabei aber ſtark und dauerhaft. Sie liefen mit weniger Friction, mit weniger Schwergang, und machten wenig oder gar kein Geräuſch. Sie mähten das Gras beſſer, beſonders auch auf unebenem Grunde.

Folgender Auszug aus dem Bericht der Committee wird dem Leſer einen Begriff von dem allgemeinen Fortſchritt geben:

„Diejenigen, welche den früheren Proben beigewohnt hatten, waren erſtaunt über den Grad der Vollkommenheit, den die Fabrikanten unſerer Mähmaſchinen erreicht hatten. Mit nur zwei Ausnahmen verrichtete jede Maſchine gute Arbeit, die jeden Farmer befriedigen mußte, und das Ausſehen der ganzen Wieſe, nachdem das Rechen vorüber war, erwies ſich trotz der unvermeidlichen Schwierigkeiten als bedeutend beſſer als das der gemähten Wieſen des beſten Farmers im Staate. Bei den früheren Proben waren nur wenige Maſchinen im Stande, im Graſe anzuhalten und dann fortzufahren, ohne erſt zurückzuweichen, um einen Anſatz zu gewinnen. Bei der gegenwärtigen Probe hielt jede Maſchine im Graſe an und fuhr dann ohne die mindeſte Schwierigkeit fort, und ohne die geringſte Spur des Anhaltens zurückzulaſſen."

Bei dieſer Probe, wie bei der von Syracuſe, erhielt die Buckeye Maſchine die goldene Medaille—ein dem Genie des Erfinders und der Geſchicklichkeit der Fabrikanten, Adriance, Platt und Co., in Poughkeepſie, New York, geſpendeter, wohlverdienter Tribut. Dieſe Maſchine wird auch (für einen Theil der Neu-England Staaten) von der Buckeye

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